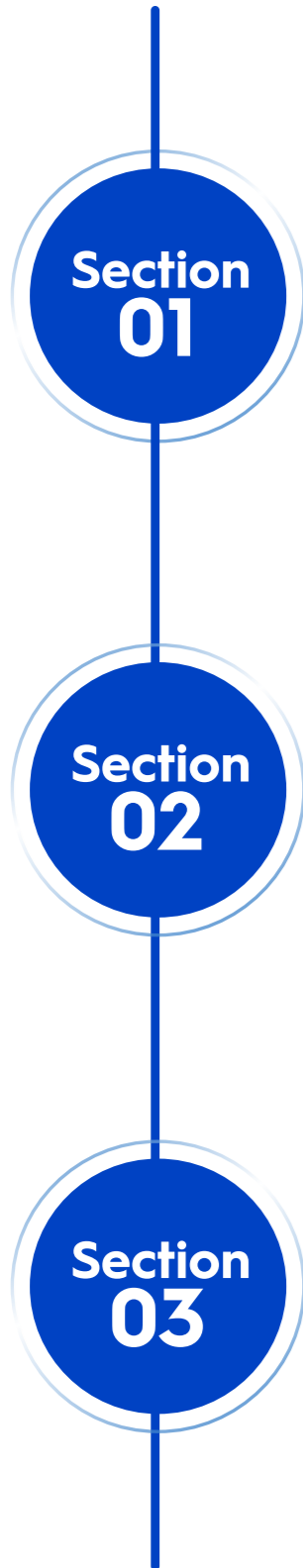




Research publications: Myopia control spectacle lenses with Highly Aspherical Lenslets

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Section 02

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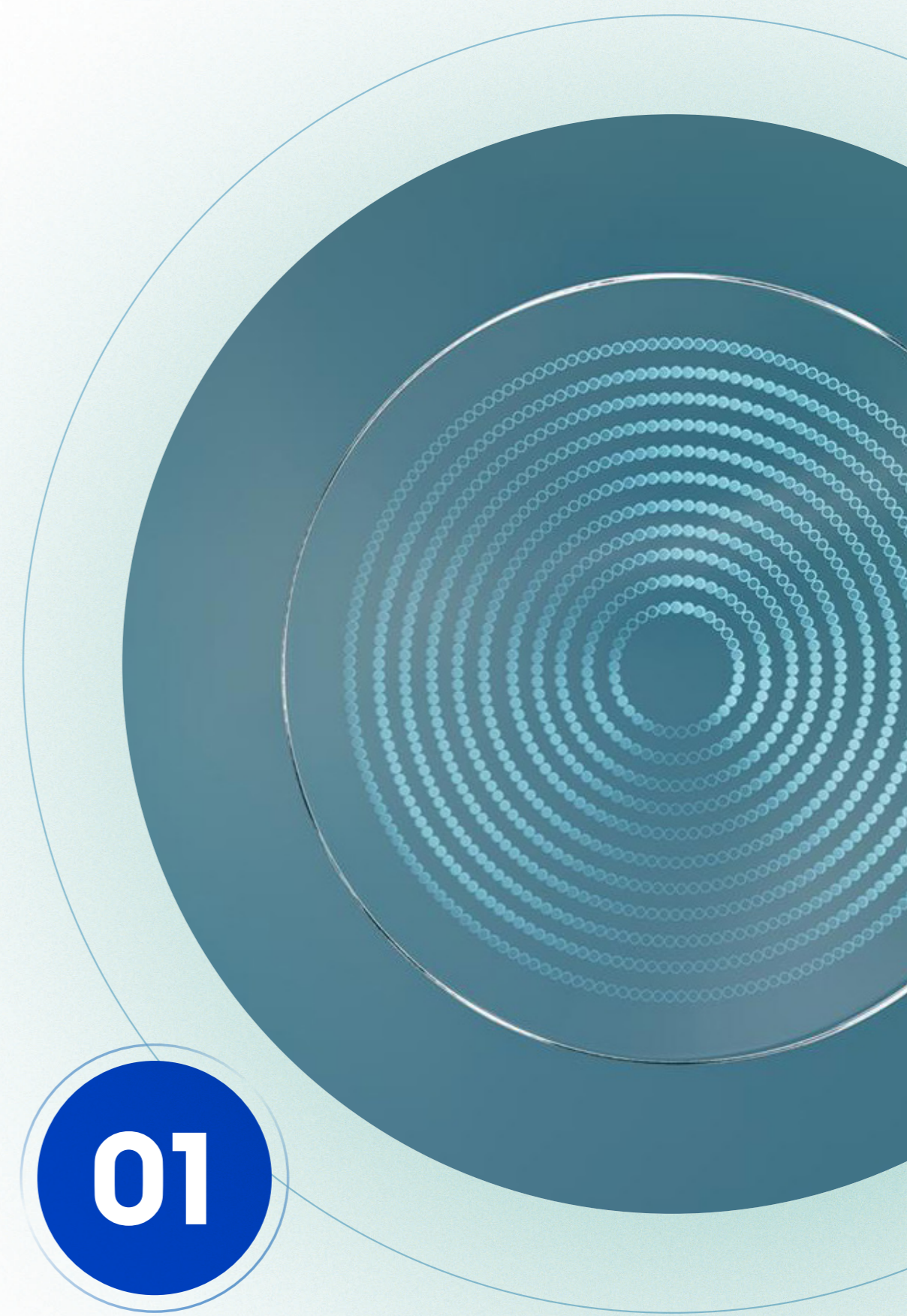
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01

ESSILOR® STELLEST® LENS EFFICACY STUDIES: 1-5 YEARS

01 MYOPIA CONTROL EFFICACY OF SPECTACLE LENSES WITH HIGHLY ASPHERICAL LENSLETS: RESULTS OF A 5-YEAR FOLLOW-UP STUDY

Study objectives



This study investigated the myopia control efficacy of spectacle lenses with Highly Aspherical Lenslets (HAL) for five years in Chinese children.

Methods

- 43 out of 51 children who wore HAL lenses continuously for three years completed the five-year visit. As it was not ethical to continue to keep the control group in single vision lenses, the new single vision lens group recruited for the third year were given a pair of HAL lenses at the end of the third year, for two more years.
- An extrapolated control group was used, based on a model in which mean axial elongation decreases as age increases, by 15.0% per year (Shamp W, et al. IOVS 2022;63:ARVO E-Abstract A0111) and a model in which SER decreases by 9.7% per year on average (Smotherman C, et al. IOVS 2023;64:ARVO E-Abstract 811).

Key results



The results showed that HAL lenses were effective **in slowing down myopia progression** and **axial elongation over five years**.

The results also showed that myopia control efficacy with HAL lenses was **sustained in older children (up to 18 years old)**.

Link to article



<https://eandv.biomedcentral.com/articles/10.1186/s40662-025-00427-3>

Citation

Li X, Huang Y, Liu C, Chang X, Cui Z, Yang Q, Drobe B, Bullimore MA, Chen H, Bao J. Myopia control efficacy of spectacle lenses with highly aspherical lenslets: results of a 5-year follow-up study. Eye and Vision. 2025 Mar 5;12(1):10.

02 EYE GROWTH PATTERN OF MYOPIC CHILDREN WEARING SPECTACLE LENSES WITH ASPHERICAL LENSLETS COMPARED WITH NON-MYOPIC CHILDREN

Study objectives



This study used longitudinal data from a randomized clinical trial and a cohort study to evaluate the eye growth of children wearing spectacle lenses with aspherical lenslets and with single-vision lenses, in comparison to eye growth patterns in non-myopic children in Wenzhou, China.

Methods

- The randomized trial, conducted in Wenzhou, China, had 170 myopic children (aged 8-13 years) randomly assigned to wear highly aspherical lenslets (HAL), slightly aspherical lenslets (SAL), or single-vision lenses (SVL).
- Normal eye growth was examined using 700 non-myopic schoolchildren (aged 7-9 years) in the Wenzhou Medical University-Essilor Progression and Onset of Myopia (WEPrOM) cohort study using logistic function models.

Key results



The study found that the **eye growth pattern** in approximately **90% of children wearing HAL full time** (compared with about 10% wearing SVL full time) **was similar or slower than that of non-myopic children both after 1-and 2-year periods**.

Therefore, after the **first year and the second year**, the **eye growth of approximately 9 out of 10 children wearing HAL lenses** was **similar or slower than non-myopic children**.

Link to article



<https://onlinelibrary.wiley.com/doi/10.1111/opo.13232>

Citation

Wong YL, Li X, Huang Y, Yuan Y, Ye Y, Lim EW, Yang A, Spiegel DP, Drobe B, Bao J, Chen H. Eye growth pattern of myopic children wearing spectacle lenses with aspherical lenslets compared with non-myopic children. Ophthalmic Physiol Opt. 2023; 00: 1-8. <https://doi.org/10.1111/opo.13232>

03 SPECTACLE LENSES WITH HIGHLY ASPHERICAL LENSLETS FOR MYOPIA CONTROL: 4-YEAR CLINICAL TRIAL RESULTS

This data was presented as a poster at the annual Association for Research in Vision and Ophthalmology (ARVO) meeting, 2023. The below summary is an abstract.

Study objectives



This study was an extension of a randomized myopia control clinical trial, designed to assess the 4-year increase in myopia and axial length (AL) with highly aspherical lenslets (HAL). Change in AL in the HAL group was compared to a single vision lens (SVL) model.

Methods

- This model was based on SVL data from the first two years of the same clinical trial, with an average decrease in AL change by 15% per year applied (Shamp W, et al. IOVS 2022;63:ARVO E-Abstract A0111).
- As the change in spherical equivalent refraction (SER) and AL were highly correlated in the SVL group in the second year, the same model was applied to SER.

Key results



Results of the study demonstrated that **myopia progression and axial elongation in children wearing HAL was slower than in the modeled control SVL group during year 4 of this clinical trial.** Furthermore, myopia control efficacy with HAL is sustained in older children (11-16 years) over a four-year period.

Link to article



<https://iovs.arvojournals.org/article.aspx?articleid=2788660>

Citation

Drobe B, Xue L, Huang Y, Lim EW, Bao J. Spectacle lenses with highly aspherical lenslets for myopia control: 4-year clinical trial results. *Investigative Ophthalmology & Visual Science*. 2023 Aug 15;64(8):4162.

04 MYOPIA CONTROL EFFICACY OF SPECTACLE LENSES WITH ASPHERICAL LENSLETS: RESULTS OF A 3-YEAR FOLLOW-UP STUDY

Study objectives



This study was an extension of a two-year randomized myopia control clinical trial. The objective of the study was to evaluate myopia control efficacy in children who continued to wear spectacle lenses with highly aspherical lenslets (HAL) or switched from spectacle lenses with slightly aspherical lenslets (SAL) and single-vision spectacle lenses (SVL) to HAL for one year, after completion of the two-year trial.

Key results



The study concluded that **HAL effectively slows down myopia progression and axial elongation in myopic children when compared with SVL over three years.** In addition, when the children switched from SVL to HAL in the third year, there was a significant decrease in myopia progression and axial elongation.

Link to article



[https://www.ajoo.com/article/S0002-9394\(23\)00147-2/fulltext](https://www.ajoo.com/article/S0002-9394(23)00147-2/fulltext)

Citation

Li X, Huang Y, Yin Z, Liu C, Zhang S, Yang A, Drobe B, Chen H, Bao J. Myopia Control Efficacy of Spectacle Lenses with Aspherical Lenslets: Results of a 3-year Follow-up Study. *American Journal of Ophthalmology*. 2023;253:160-168. DOI: <https://doi.org/10.1016/j.ajo.2023.03.03>

05 SPECTACLE LENSES WITH HIGHLY ASPHERICAL LENSLETS FOR SLOWING MYOPIA: A RANDOMIZED, DOUBLE-BLIND, CROSS-OVER CLINICAL TRIAL

Study objectives



The objective of the study was to evaluate myopia progression with spectacles with highly aspherical lenslets (HAL) compared to single vision spectacle lenses.

Key results



The randomized, double-masked, cross-over clinical trial demonstrated that **HAL lenses slow myopia in Vietnamese children with myopia.**

Importantly, when children switched from HAL to single vision spectacle lenses, **progression was similar to that observed with use of single vision spectacles and indicates no rebound of myopia progression.** Compliance was high with no differences compared to single vision lenses.

Link to article



[https://www.ajco.com/article/S0002-9394\(22\)00418-4/fulltext](https://www.ajco.com/article/S0002-9394(22)00418-4/fulltext)

Citation

Sankaridurg P, Weng R, Tran H, Spiegel DP, Drobe B, Ha T, Tran YH, Naduvilath T. Spectacle Lenses With Highly Aspherical Lenslets for Slowing Myopia: A Randomized, Double- Blind, Cross-Over Clinical Trial. American Journal of Ophthalmology. 2023;247:18-24. DOI: [https:// doi.org/10.1016/j.ajco.2022.10.021](https://doi.org/10.1016/j.ajco.2022.10.021)

06 SPECTACLE LENSES WITH ASPHERICAL LENSLETS FOR MYOPIA CONTROL VS SINGLE-VISION SPECTACLE LENSES: A RANDOMIZED CLINICAL TRIAL

Study objectives



The objective of this randomized clinical trial was to evaluate whether spectacle lenses with higher lenslet asphericity have a higher myopia control efficacy during the course of two years.

Methods

- The clinical trial was conducted between July 2018 and October 2020 at the Eye Hospital of Wenzhou Medical University in Wenzhou, China.
- In this study, both spectacle lenses with highly aspherical lenslets (HAL) and spectacle lenses with slightly aspherical lenslets (SAL) effectively slowed myopia progression and axial elongation throughout two years, compared with single vision spectacle lenses (SVL).

Key results



Higher lenslet asphericity led to higher myopia control efficacy, therefore **HAL lenses were significantly more effective at slowing down myopia progression than SAL lenses and SVL.**

The study also demonstrated that the **wearing time considerably influenced the treatment outcome**, with longer wearing hours resulting in better myopia control efficacy for HAL.

Link to article



<https://jamanetwork.com/journals/jamaophthalmology/fullarticle/2790589>

Citation

Bao J, Huang Y, Li X, Yang A, Zhou F, Wu J, Wang C, Li Y, Lim EW, Spiegel DP, Drobe B, Chen, H. Spectacle lenses with aspherical lenslets for myopia control vs single-vision spectacle lenses: a randomized clinical trial. JAMA ophthalmology. 2022;140(5):472-8. DOI:10.1001/ jamaophthalmol.2022.0401

07 ONE-YEAR MYOPIA CONTROL EFFICACY OF SPECTACLE LENSES WITH ASPHERICAL LENSLETS

Study objectives



This paper evaluates the one-year efficacy of two myopia control spectacle lenses with lenslets of different asphericity: spectacle lenses with highly aspherical lenslets (HAL) and spectacle lenses with slightly aspherical lenslets (SAL).

Key results



Spectacle lenses with aspherical lenslets—both HAL and SAL—effectively slowed myopia progression and axial elongation compared with single vision spectacle lenses. Higher lenslet asphericity led to higher myopia control efficacy, so HAL lenses were more effective at slowing down myopia progression than SAL lenses.

This demonstrated that **HAL is a good solution for children, to help slow down their myopia progression and reduce related risks later in life.**

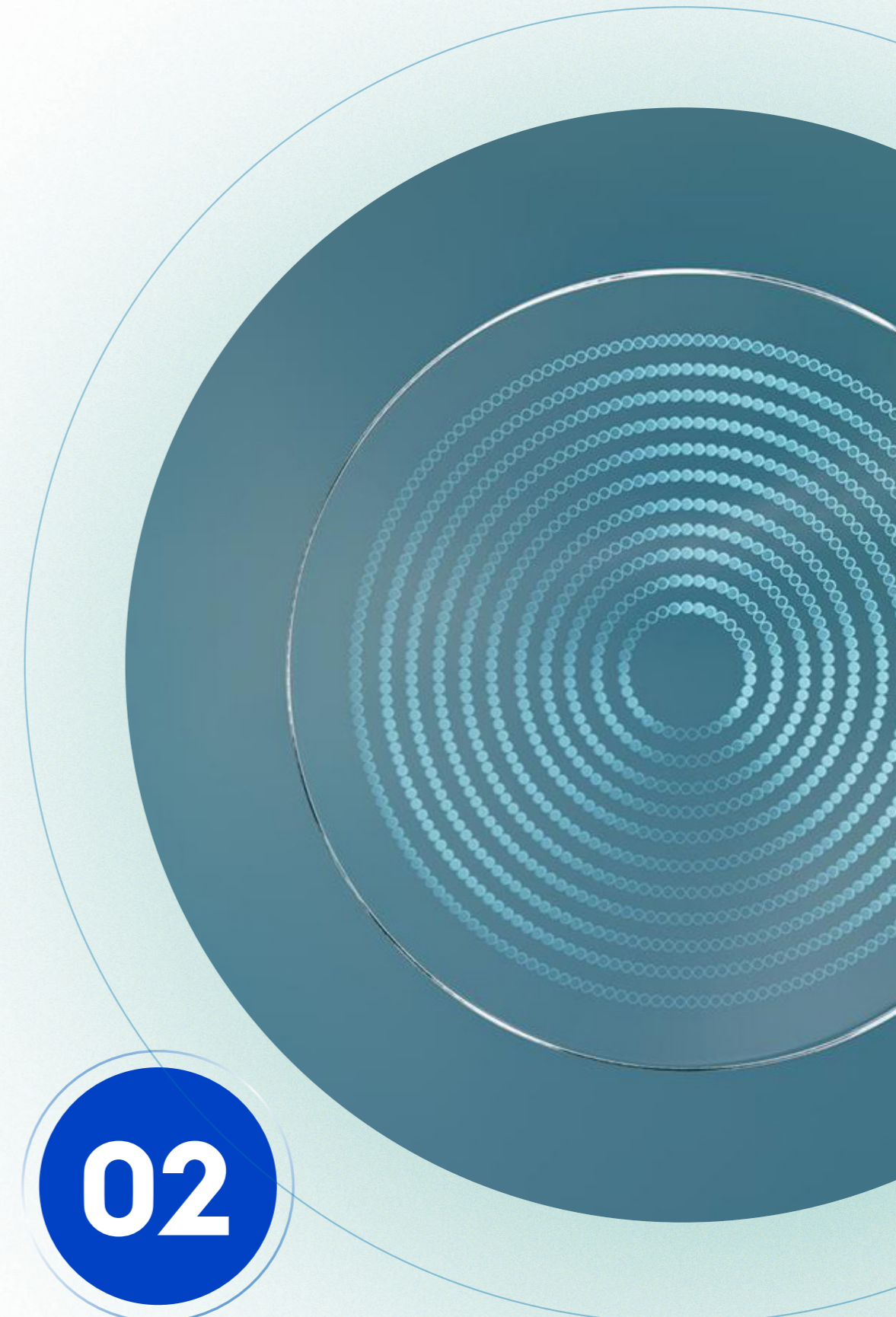
Link to article



<https://bjo.bmj.com/content/early/2021/04/01/bjophthalmol-2020-318367>

Citation

Bao J, Yang A, Huang Y, Li X, Pan Y, Ding C, Lim EW, Zheng J, Spiegel DP, Drobe B, Lu F. One-year myopia control efficacy of spectacle lenses with aspherical lenslets. *British Journal of Ophthalmology*. 2022;106(8):1171-6. DOI: <https://doi.org/10.1136/bjophthalmol-2020-318367>



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08 EFFECT OF SPECTACLE LENSES WITH HIGHLY ASPHERICAL LENSLETS ON CHANGES IN PERIPHERAL EYE LENGTH AND ASYMMETRY

Study objectives



This study aimed to explore the impact of highly aspherical lenslets (HAL) on peripheral eye length (PEL) and peripheral refraction (PR)

Methods

- Fifty-two children who continued wearing HAL in Year 3, as well as in 51 and 48 participants who had originally worn spectacle lenses with slightly aspherical lenslets (SAL) or single-vision lenses (SVL) for two years and switched to HAL (SAL-HAL and SVL-HAL groups, respectively) in Year 3. A new control group of 56 children wearing SVL was enrolled (new-SVL group) for Year 3.

Key results



All three HAL groups exhibited less elongation than the new-SVL group. PR changes in the parafoveal temporal and superior regions significantly differed among the groups, with the new-SVL group progressing more than the three HAL groups. **Compared with wearing SVL, switching to or continuing to wear HAL could slow central and temporal elongation of eye length.** Wearing HAL could impact retinal steepness and symmetry.

Link to article



<https://onlinelibrary.wiley.com/doi/10.1111/opo.13500>

Citation

Huang Y, Li X, Wang Y, Drobe B, Chen H, Bao J. Effect of spectacle lenses with highly aspherical lenslets on changes in peripheral eye length and asymmetry. *Ophthalmic and Physiological Optics*. 2025; <https://doi.org/10.1111/opo.13500>

09 EFFECT OF SPECTACLE LENSES WITH ASPHERICAL LENSLETS ON CHOROIDDAL THICKNESS IN MYOPIC CHILDREN: A 3-YEAR FOLLOW-UP STUDY

Study objectives



This study was conducted to explore the effect of wearing spectacle lenses with Highly Aspherical Lenslets (HAL) for three years and the impact of switching from single-vision lenses (SVL) to HAL lenses on choroidal thickness.

Methods

- A total of 51 participants in the HAL group, 50 participants in the spectacle lenses with Slightly Aspherical Lenslets (SAL)-HAL group, 41 participants in the SVL-HAL group and 48 participants in the new-SVL group completed the third year of follow-up and all examinations. Choroidal thickness was measured every six months.

Key results



The key outcomes from the study were that **during the third year, children who consistently wore or switched to wearing HAL lenses demonstrated significantly less choroidal thinning compared to children wearing SVL.**

Children who wore HAL for 3 years tended to exhibit greater choroidal thickness than did those who switched from SVL or SAL to HAL.

Link to article



<https://eandv.biomedcentral.com/articles/10.1186/s40662-024-00383-4>

Citation

Huang Y, Li X, Zhuo Z, Zhang J, Que T, Yang A, Drobe B, Chen H, Bao J. Effect of spectacle lenses with aspherical lenslets on choroidal thickness in myopic children: a 3-year follow-up study. *Eye and Vision*. 2024 Apr 25;11(1):16.

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10 EFFECTS OF SPECTACLE LENSES WITH ASPHERICAL LENSLETS ON PERIPHERAL EYE LENGTH AND PERIPHERAL REFRACTION IN MYOPIC CHILDREN: A 2-YEAR RANDOMIZED CLINICAL TRIAL

Study objectives



This study investigated changes in peripheral eye length (PEL) and peripheral refraction in 170 myopic children aged 8 to 13 years after wearing spectacle lenses with highly aspherical lenses (HAL), slightly aspherical lenses (SAL) or single vision lenses (SVL) for 2 years.

Key results



PEL significantly (all $P < 0.001$) increased with time, with the greatest elongation in the SVL group and the least in the HAL group. In the **SVL group, the retina steepened and the peripheral retinal defocus became more hyperopic with 2-year myopia progression.**

In the **SAL group, the retina steepened and peripheral hyperopic defocus increased, but with less magnitude than in the SVL group.**

Participants wearing HAL spectacle lenses had faster PEL elongation than axial elongation, resulting in a flattened retina and decreased peripheral hyperopic defocus over 2 years.

Link to article



<https://tvstarvojournals.org/article.aspx?articleid=2793005>

Citation

Huang Y, Zhang J, Yin Z, Yang A, Spiegel DP, Drobe B, Chen H, Bao J, Li X. Effects of Spectacle Lenses With Aspherical Lenslets on Peripheral Eye Length and Peripheral Refraction in Myopic Children: A 2-Year Randomized Clinical Trial. *Transl Vis Sci Technol.* 2023;12(11):15. DOI: 10.1167/tvst.12.11.15.

11 IMPACT OF MYOPIA CONTROL SPECTACLE LENSES WITH HIGHLY ASPHERICAL LENSLETS ON PERIPHERAL VISUAL ACUITY AND CENTRAL VISUAL ACUITY WITH PERIPHERAL GAZE

Study objectives



The objective of the study was to evaluate the impact of a myopia control spectacle lens with highly aspherical lenslets (HAL) on central visual acuity with peripheral gaze and peripheral visual acuity.

Methods

- In this study, two lens designs, HAL and a standard single-vision lens (SVL) were evaluated in counterbalanced order for each test conducted.
- The study had sixteen adults (27-52 years of age; spherical equivalent refraction (SER), -8.75 D to +0.50 D) wearing their habitual visual correction, who carried out all tests monocularly.

Key results



Based on the results, the study concluded that **under the high-contrast and low-luminance condition, HAL reduced central visual acuity with peripheral gaze by approximately one line, but did not affect peripheral visual acuity, compared with SVL.**

The impact on central visual acuity did not alter with age, gaze direction, or SER.

Link to article



<https://onlinelibrary.wiley.com/doi/full/10.1111/opo.13127>

Citation

Gao, Y, Lim, EW, Drobe, B. Impact of myopia control spectacle lenses with highly aspherical lenslets on peripheral visual acuity and central visual acuity with peripheral gaze. *Ophthalmic Physiol Opt.* 2023;43:566-571. DOI: <https://doi.org/10.1111/opo.13127>

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12 SPECTACLES WITH HIGHLY ASPHERICAL LENSLETS FOR MYOPIA CONTROL DO NOT CHANGE VISUAL SENSITIVITY IN AUTOMATED STATIC PERIMETRY

Study objectives



The objective of the study was to evaluate the possible impact of wearing spectacle lenses with highly aspherical lenslets (HAL) on the visual field sensitivity.

Methods

- In order to measure the detection sensitivity in the visual field, an automated static perimetry test was used with 21 adults (age 23–61, spherical equivalent refractive error (SER) -8.75 D to +0.88 D) to measure the sensitivities through HAL and a single vision lens (SVL) as the control lens, in random order.

Key results



The study showed **no significant correlation between the difference in sensitivity and age or SER**. It concluded that compared to SVL, HAL did not change detection sensitivity to static targets across the visual field in automated static perimetry.

Link to article



<https://www.frontiersin.org/articles/10.3389/fnins.2022.996908/full>

Citation

Gao Y, Spiegel DP, Muzahid IA, Lim EW, Drobe B. Spectacles with highly aspherical lenslets for myopia control do not change visual sensitivity in automated static perimetry. *Frontiers in Neuroscience*. 2022;16:996908. DOI: 10.3389/fnins.2022.996908

13 EFFECT OF SPECTACLE LENSES WITH ASPHERICAL LENSLETS ON CHOROIDDAL THICKNESS IN MYOPIC CHILDREN: A 2-YEAR RANDOMIZED CLINICAL TRIAL

Study objectives



The objective of the study was to examine the long-term influence of spectacle lenses with highly aspherical lenslets (HAL) and slightly aspherical lenslets (SAL) on macular choroidal thickness (ChT) in myopic children.

Methods

- The two-year randomized clinical trial was conducted at the Eye Hospital of Wenzhou Medical University in Wenzhou, China.

Key results



The study showed that **over two years, wearing spectacle lenses with aspherical lenslets reduced or eliminated the thinning of the ChT**, compared with the use of single vision lenses, with HAL having a better effect by preserving the initial ChT and even increasing it.

Link to article



<https://bjo.bmj.com/content/early/2022/09/27/bjo-2022-321815>

Citation

Huang Y, Li X, Wu J, Huo J, Zhou F, Zhang J, Yang A, Spiegel DP, Chen H, Bao J. Effect of spectacle lenses with aspherical lenslets on choroidal thickness in myopic children: a 2-year randomized clinical trial. *British Journal of Ophthalmology*. 2022 Sep 27. DOI: 10.1136/bjo-2022-321815

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14 VISUAL ACUITY, NEAR PHORIA AND ACCOMMODATION IN MYOPIC CHILDREN USING SPECTACLE LENSES WITH ASPHERICAL LENSLETS: RESULTS FROM A RANDOMIZED CLINICAL TRIAL

Study objectives



The objective of this study was to examine the short- and long-term effects of myopia control spectacle lenses with highly aspherical lenslets (HAL) and slightly aspherical lenslets (SAL) on visual function and visual quality.

Methods

- The study utilized data from a prospective, randomized, controlled, and double-blinded study where 170 myopic children aged 8-13 years were randomly assigned to the HAL, SAL, or single-vision spectacle lenses (SVL) groups.

Key results



The study concluded that **both HAL and SAL do not have a significant influence on accommodation and phoria, but had larger accommodative micro-fluctuations (AMFs) compared to SVL.** After a year of use, visual acuity with HAL and SAL recovered to be at the same level as SVL.

Link to article



<https://eandv.biomedcentral.com/articles/10.1186/s40662-022-00304-3>

Citation

Huang Y, Li X, Wang C, Zhou F, Yang A, Chen H, Bao J. Visual acuity, near phoria and accommodation in myopic children using spectacle lenses with aspherical lenslets: Results from a randomized clinical trial. *Eye and Vision*. 2022;9(1):33. DOI: <https://doi.org/10.1186/s40662-022-00304-3>

15 THE IMPACT OF SPECTACLE LENSES FOR MYOPIA CONTROL ON VISUAL FUNCTIONS

Study objectives



This research paper evaluated the impact of two new myopia control spectacle lens designs: spectacle lenses with Highly Aspherical Lenslets (HAL) and Slightly Aspherical Lenslets (SAL), on different visual functions.

Key results



The study concluded that **high contrast visual acuity and all the peripheral measures of vision were not affected by both the lens designs** when compared to single vision lenses, however there was a **slight reduction in low contrast visual acuity through the periphery.**

In addition, the study also concluded that the lens designs were safe to use for myopia control, as they did not impact tested central and peripheral visual functions.

Link to article



<https://onlinelibrary.wiley.com/doi/10.1111/opo.12878>

Citation

Gao, Y, Lim, EW, Yang, A, Drobe, B, Bullimore, MA. The impact of spectacle lenses for myopia control on visual functions. *Ophthalmic and Physiological Optics*. 2021;41:1320-1331. <https://doi.org/10.1111/opo.12878>

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16 INFLUENCE OF LENSLET CONFIGURATION ON SHORT-TERM VISUAL PERFORMANCE IN MYOPIA CONTROL SPECTACLE LENSES

Study objectives



The objective of this study was to assess the optical quality and visual performance of three different lenslet configurations on myopia control spectacle lenses – lenses with concentric rings of contiguous highly aspherical lenslets (HAL), lenses with concentric rings of slightly aspherical lenslets (SAL), and lenses with honeycomb configuration of spherical lenslets (HC).

Key results



The study concluded that **HAL and SAL had a substantially lower negative impact on visual acuity and contrast sensitivity**, and there was **no significant effect on short-term visual performance** by looking through the lenslet structure of myopia control spectacle lenses.

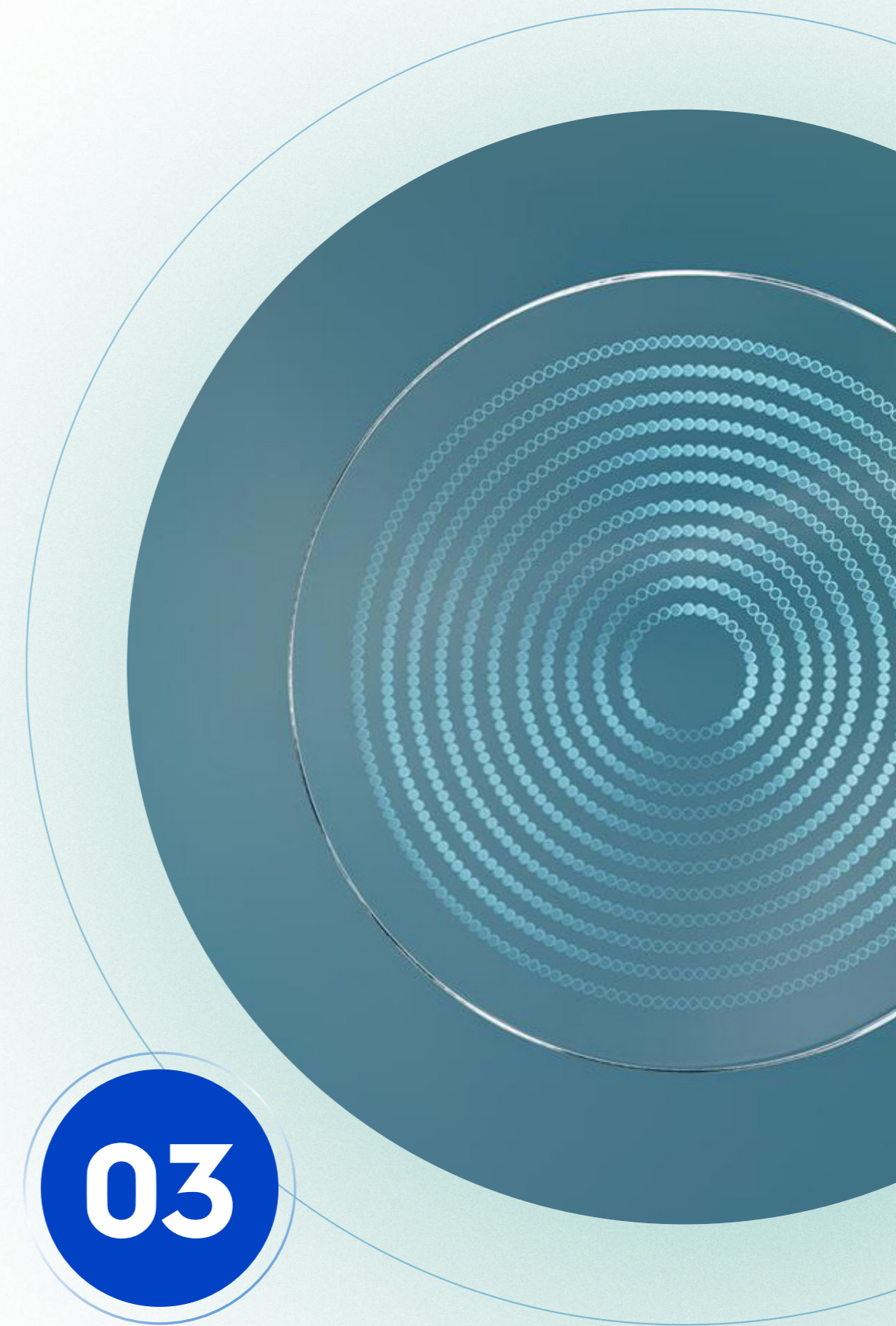
Link to article



<https://www.frontiersin.org/articles/10.3389/fnins.2021.667329/full>

Citation

Li X, Ding C, Li Y, Lim EW, Gao Y, Fermigier B, Yang A, Chen H and Bao J. Influence of Lenslet Configuration on Short-Term Visual Performance in Myopia Control Spectacle Lenses. *Frontiers in Neuroscience*. 2021;15:667329. DOI: 10.3389/fnins.2021.667329



INDEPENDENT RESEARCH

Independent Research

17 SPECTACLE LENSES WITH HIGHLY ASPHERICAL LENSLETS FOR SLOWING AXIAL ELONGATION AND REFRACTIVE CHANGE IN LOW-HYPEROPIC CHINESE CHILDREN: A RANDOMIZED CONTROLLED TRIAL

Study objectives



This randomized controlled trial investigated the effects of spectacle lenses with highly aspherical lenslets (HAL) on refractive and axial length (AL) changes in Chinese children with low hyperopia.

Methods

• A total of 108 children aged 6 to 9.9 years were assigned to either the HAL group or a single vision lens (SVL) group. After one year, both groups showed similar changes in spherical equivalent refractive error, but the HAL group who wore their lenses for over 30 hours per week exhibited significantly less AL elongation, compared to the SVL group.

Key results



The study concluded that **HAL spectacle lenses significantly slowed down AL elongation in low hyperopic children wearing them over 30 hours per week**, showing a dose-response relationship where longer wear times correlated with less AL change.

Link to article



<https://pubmed.ncbi.nlm.nih.gov/39197509/>

Citation

Zhang Z, Zeng L, Gu D, Wang B, Kang P, Watt K, Zhou J, Zhou X, Chen Z, Yang D, Chen C. Spectacle Lenses With Highly Aspherical Lenslets for Slowing Axial Elongation and Refractive Change in Low-Hyperopic Chinese Children: A Randomized Controlled Trial. *American Journal of Ophthalmology*. 2025 Jan 1;269:60-8.

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