

# A Powerful Approach to Myopia Management

## New Tools Can Help Clinicians Stay Ahead of the Curve



Thomas Aller, OD, FBCLA

As the incidence of myopia increases worldwide, with a predicted prevalence of around 50% of the world's population by 2050,<sup>1</sup> eyecare professionals likely will see an uptick in visits from younger patients in need of diagnosis, prognosis, and treatment. While some clinicians may have sidestepped the myopia arena until now, they have a unique opportunity to begin screening for and managing this growing population of patients. Actively searching for patients at risk for developing myopia and utilizing the available spectacles, contact lenses, orthokeratology and low dose atropine to effectively manage myopia is now

the standard of care, as noted by a number of professional organizations.<sup>2,3</sup>

Providing care for myopic and at-risk patients will not only offer the eyecare practice another touchpoint with patients and their family members, but it affords the possibility of detecting myopia and high myopia early. This is especially important since high myopia brings with it heightened risk of vision impairment associated with retinal damage, cataracts, and glaucoma.<sup>1</sup> As persuasively argued in a recent article, "there is no safe level of myopia"<sup>4</sup> and "each diopter matters."<sup>5</sup>

Lenstar Myopia from Haag-Streit, is an all-inclusive, turn-key system which includes the device, software with viewer licenses, computer, monitor, power table, and printer.



Lenstar Myopia Device

### A Comprehensive Tool to Track Myopia

To optimally address myopia in the practice, comprehensive diagnostic, monitoring, and management are needed along with the right tools. While several biometers approved in the US have been found to effectively measure axial length, it's helpful to understand the unique needs of a practice to find the right solution.

Lenstar Myopia, launched in 2020, combines the established Lenstar 900 optical biometer with EyeSuite Myopia

Sponsored by



## An Advanced Approach to Track Progression

In his research to create the Age-Matched Myopia Control (AMMC<sup>®</sup>) framework, Prof. Dr. Hayan Kaymak and his team found, to assess myopia progression, evaluating the speed of axial length change is preferable to refractive change when determining therapy and measuring its effectiveness.<sup>1,2</sup> They concluded that the primary goal of myopia therapy in children should be reducing abnormally fast axial length growth. The team uncovered, through epidemiologically collected growth curves, that eyes with an axial length associated with adult emmetropia experience their highest growth rates in childhood,<sup>3,4,5</sup> and that physiologically required axial length growth underlies the excessive axial length growth of pediatric myopic eyes.

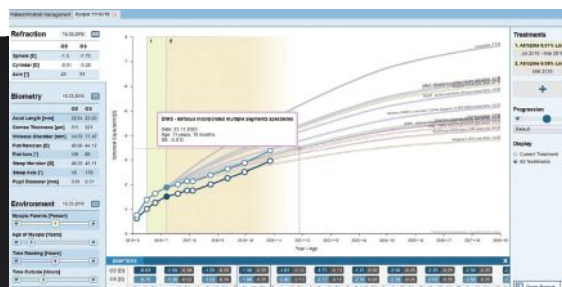
Based on these findings,<sup>6</sup> the team extracted new epidemiological growth curves describing so-called “physiological” axial length growth as a function of age. Dr. Kaymak’s work demonstrates that targeting such a growth rate—which varies slightly by gender and age<sup>3,4,5</sup>—should be a goal for myopia therapy. They developed the AMMC<sup>®</sup> framework with that strategy in mind.

1. Kaymak H, Graff B, Neller K, et al. (2022, September 4-7) Myopia therapy – keep it simple: physiological axial length growth as the treatment goal. Poster presented at the International Myopia Conference. Rotterdam, Netherlands.
2. Cho P, Cheung SW, Boost MV. Categorisation of myopia progression by change in refractive error and axial elongation and their impact on benefit of myopia control using orthokeratology. PLoS One. 2020 Dec 29;15(12):e0243416.
3. Tideman JW, Polling JR, Vingerling JR, et al. Axial length growth and the risk of developing myopia in European children. Acta Ophthalmol. 2018 May;96(3):301-9.
4. Trukenbrod C, Meigen C, Brandt M, et al. Longitudinal analysis of axial length growth in a German cohort of healthy children and adolescents. Ophthalmic Physiol Opt. 2021 May;41(3):532-540.3-5.
5. Sanz Diez P, Yang LH, Lu MX, et al. Growth curves of myopia-related parameters to clinically monitor the refractive development in Chinese schoolchildren. Graefes Arch Clin Exp Ophthalmol. 2019 May;257(5):1045-53.
6. Kaymak H, Neller K, Graff B, et al. Optometrische Schulreihenuntersuchungen : Erste epidemiologische Daten von Kindern und Jugendlichen der 5. bis 7. Klasse [Optometric eye screening in schools : First epidemiological data for children and adolescents in grades 5-7]. Ophthalmologe. 2022 Jan;119(Suppl 1):33-40.

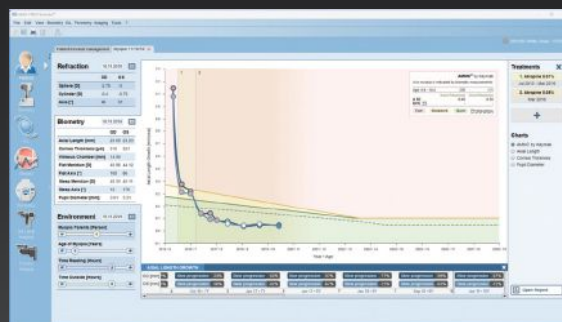
software, developed according to the latest clinical findings and collaboration with international myopia experts. It offers three simple, yet pivotal, analytic models for myopia diagnostics and management based on refraction, axial length measurement, and the influences of environmental factors.

**Refraction.** The software’s refractive analysis, which I helped develop in collaboration with Pascal Blaser of myopicare.com, presents refractive progression trends based on predicted outcomes of different treatment methods, and compares them to the untreated course of myopia. The patient’s refractive status is shown with calculations based on literature-based average control rates that can be adapted according to the practitioner’s experience or as new control rates become available in the published literature.

**Axial Length Measurement.** Visualization of axial length or biometry data supports myopia progression analysis by overlaying axial length growth curves of peer-reviewed population-based studies. Additional measurements such



Lenstar Myopia’s Refraction display visualizes a patient’s current refraction with progression curves indicating different treatments with their reported efficacies.



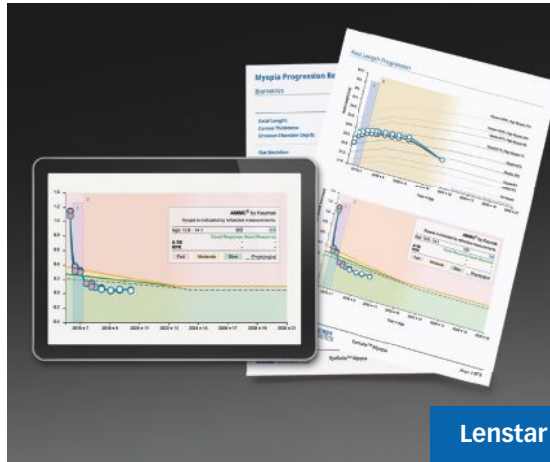
Lenstar Myopia’s Age-Matched Myopia Control uses a traffic light system to clearly indicate when a patient’s axial length growth rate is abnormally fast compared with emmetropic patients of the same age and gender.

as pupillometry, vitreous chamber depth, central corneal thickness, and keratometry add additional insights to better facilitate accurate predictions about the onset and progression of myopia, as well as provide information required for treatments such as corrective lenses. Three distinct progression visualizations are available based on data from the Tideman myopia study,<sup>6</sup> a meta-analysis which distinguishes between Asian and Caucasian myopia development risks, and the recently released AMMC<sup>®</sup> framework.

The **Age-Matched Myopia Control (AMMC<sup>®</sup>) framework** developed by Prof. Dr. Hakan Kaymak tracks axial growth based on extensive research analysis and clinical findings. While axial length growth is normal at a young age, distinguishing pathological axial length growth from emmetropic growth is necessary to ascertain patient myopia status. AMMC<sup>®</sup> compares axial length growth speed to a broad demographic database to rapidly uncover pathologically fast-growing eyes and classify axial length growth as “low/tolerable,” “moderate,” or “high.” Eyecare professionals receive a clear indication for the need for therapeutic action based on the age and status of the patient. Importantly, excessive axial length growth can be detected before it becomes visible in refraction so treatment can be administered in pre-myopic children to keep axial length growth in a desirable physiological range.

**Environment.** The third module is an interactive tool. It displays the impact of environmental factors such as myopic parents, age of onset, time spent outside, time spent reading or doing near eye work, and their potential effects on myopia progression. With the device’s easy customization capabilities, doctors can even add the capability to track mobile and tablet usage for parents.

Having had the somewhat unique experience of being able to use optical biometry for over 20 years and having had the opportunity to be involved with the Lenstar Myopia’s early development, I can confidently assert that the level of precision offered by this tool allows for optimized myopia management for each individual patient. Subjective



The Lenstar Myopia parental report is a customizable, printable report of each patient’s status and includes their individualized treatment plans.

## Lenstar Myopia Parental Report

refractions are notoriously inaccurate, even with cycloplegia in clinical trials, with differences of 0.50D or more necessary to have confidence that there really is a difference between two measurements. With a reported standard deviation of 0.015mm and repeatability of 0.04mm,<sup>7</sup> Lenstar Myopia offers the possibility of increased accuracy and rapid assessment of treatment effectiveness.

### Simple & Accurate Measurements & Reports

At the heart of myopia management is the ability to correctly measure children’s eyes. Being able to easily and rapidly capture measurements with the click of a joystick can increase doctor and patient comfort. This is especially important because children can be impatient and have difficulty cooperating with the measurement process.

Lenstar 900’s Automated Positioning System (APS) offers such ease of measurement while yielding essential data such as axial length, pupillometry, vitreous chamber depth, central corneal thickness, and keratometry to improve predictive accuracy about the onset and progression of myopia.

Yet, the right information is not valuable if it can’t be communicated in a clear, understandable way to parents. Lenstar Myopia’s customizable report, based on «myopia.care™», provides parents with digestible information to encourage them to actively participate in their child’s myopia management.

Sponsored by



---

## Helping to Catch Myopia Early

Since myopia treatments, on average, can only slow progression, to achieve the lowest possible level of myopia and risk of myopia-related pathologies, it is advisable for clinicians to identify future myopes in the pre-myopia stage and to start treatment when convinced the child is likely to be a future myope.<sup>1</sup> Pre-myopia has been defined as having a level of hyperopia that is insufficient for the age,<sup>2</sup> so failing to slow hyperopia or acceleration of axial elongation are likely signs of future myopia. With the fastest axial growth reportedly occurring up to two years prior to the official onset of myopia,<sup>3</sup> it can be very helpful to identify these patients prior to myopia onset and begin treatment.

Lenstar Myopia is quite valuable for such a strategy, as it precisely measures axial length and provides percentile curves and predictions of future myopia based on age and axial length. The new AMMC<sup>®</sup> analysis also provides rapid comparison of observed growth rates with age- and gender-matched emmetropic growth rates for fast determination of the risk of future myopia. While early treatment of future myopia helps to deliver the best final outcome, it is always challenging to suggest a treatment for a condition that is not yet present. However, the availability of precision measurements and normative data summarized and illustrated in thorough reports offered by Lenstar Myopia helps the practitioner make the case for early treatment.

1. Aller TA. Clinical management of progressive myopia. *Eye (Lond)*. Feb 2014;28(2):147-53.

2. Flitcroft DI, He M, Jonas JB, et al. IMI - Defining and Classifying Myopia: A Proposed Set of Standards for Clinical and Epidemiologic Studies. *Invest Ophthalmol Vis Sci*. 02 2019;60(3):M20-M30.

3. Mutti DO, Hayes JR, Mitchell GL, et al. Refractive error, axial length, and relative peripheral refractive error before and after the onset of myopia. *Invest Ophthalmol Vis Sci*. Jun 2007;48(6):2510-9.

Lenstar Myopia is fast, accurate and non-invasive. With its Automated Positioning System (APS), capturing measurements is quick and easy.



---

## Moving Forward With Myopia Care

While it is not the standard of care for every eye care practitioner to become a myopia management specialist, it is the standard of care to identify those patients at risk of developing myopia. Every doctor can and should be prescribing treatments that slow myopia in order to reduce the likelihood of future visual impairment in the vast majority of children at risk of developing myopia. That said, some doctors may wish to detect and refer myopia patients, some may wish to limit their treatments to simple but effective therapies such as novel myopia-controlling spectacles or low dose atropine, and other doctors may want to specialize at the highest level of myopia management. In all cases, Lenstar Myopia, with its demonstrated precision, ease of use, and beneficial predictive and tracking capabilities, is an incredibly helpful tool for comprehensive myopia management.

1. The Impact Of Myopia And High Myopia. Report of the Joint World Health Organization–Brien Holden Vision Institute Global Scientific Meeting on Myopia. Available at: [https://myopiainstitute.org/wp-content/uploads/2020/10/Myopia\\_report\\_020517.pdf](https://myopiainstitute.org/wp-content/uploads/2020/10/Myopia_report_020517.pdf) (last accessed July 27, 2023).

2. WCO. Resolution: The Standard of Care for Myopia Management by Optometrists. <https://worldcouncilofoptometry.info/resolution-the-standard-of-care-for-myopia-management-by-optometrists/> (last accessed September 18, 2023).

3. Modjtahedi BS, Abbott RL, Fong DS, et al. Reducing the global burden of myopia by delaying the onset of myopia and reducing myopic progression in children: The Academy's Task Force on Myopia. *Ophthalmology*. Jun 2021;128(6):816-26.

4. Flitcroft DI. The complex interactions of retinal, optical and environmental factors in myopia aetiology. *Prog Retin Eye Res*. Nov 2012;31(6):622-60.

5. Bullimore MA, Brennan NA. Myopia control: why each diopter matters. *Optom Vis Sci*. 06 2019;96(6):463-5.

6. Tideman JWL, Polling JR, Vingerling JR, et al. Axial length growth and the risk of developing myopia in European children. *Acta Ophthalmol*. 2018 May;96(3):301-9.

7. Kaymak H, Graff B, Neller K, et al. (2022, September 4-7) Myopia therapy – keep it simple: physiological axial length growth as the treatment goal. Poster presented at the International Myopia Conference. Rotterdam, Netherlands.

*Thomas Aller, OD, FBCLA, has been researching myopia control methods for over 30 years. In 2016, he launched Myappia, a myopia progression app, and he has collaborated with myopiicare.com and Haag-Streit on Lenstar Myopia. Dr. Aller is a UC Berkeley Visiting Scholar and has served as an Adjunct Professor at the UH College of Optometry. He also serves as a consultant and advisor to several companies working on myopia control contacts, spectacles, pharmaceuticals, and medical devices.*