# Leveraging the OCULUS Myopia and WAVE Lens Designer Software with Data-Driven Myopia Management

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Dr. Cerenzie is a specialty lens and myopia management enthusiast. She is the owner of Charlotte Contact Lens Institute and the Raleigh Contact Lens Institute, practices solely dedicated to providing specialty contact lens and myopia management care. Dr. Cerenzie attended optometry school at the University of Houston College of Optometry and completed a Cornea and Contact Lens residency at the University of Missouri-St. Louis College of Optometry. She is a fellow of the American Academy of Optometry and the Scleral Lens Education Society and the secretary of the Piedmont Optometric group.

Objective axial length analysis and longitudinal growth tracking have become increasingly important in pediatric myopia management. In our practice, the OCULUS Myopia software platform on the OCULUS Pentacam® AXL Wave has helped us better evaluate progression risk through BHVI Growth Curves and annualized axial growth analysis, while the WAVE Lens Designer Software has streamlined customized orthokeratology lens design through the tomography/-topography-driven software. Together, these technologies have been a game-changer in clinical decision-making, parent communication, and treatment efficiency.

## Clinical Relevance

Objective axial length analysis provides clinicians with a more reliable and repeatable way to monitor myopic progression compared to relying on refractive error alone, which represents only part of the overall picture. Having insight into a patient's axial length can help clinicians better predict future myopic onset, identify accelerated axial elongation that may occur before significant refractive changes are observed, and understand where the patient falls relative to age-matched normative data, all of which can help guide how aggressively myopia management treatment should be pursued.

One of the most valuable features of the OCULUS Myopia software in our practice has been the integration of BHVI Growth Curves and longitudinal Growth Analysis. Rather than evaluating raw axial length values alone, clinicians can compare ocular growth against age-matched normative databases to determine whether progression exceeds expected physiologic ranges.

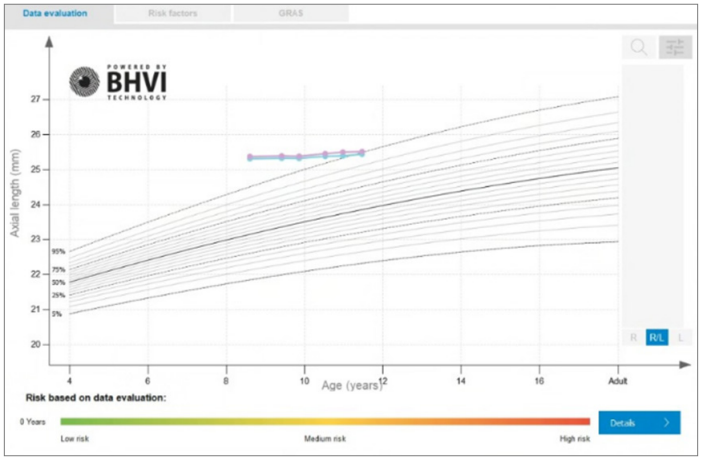


**Figure 1:** BHVI Growth Curve demonstrating baseline axial length measurements significantly exceeding age-matched normative ranges, followed by stabilization of axial elongation over 3.5 years of monitoring with the OCULUS Pentacam® AXL Wave, consistent with successful myopia management control with orthokeratology wear

We have found this especially helpful in communication with parents. The BHVI Growth Curves help transform conversations regarding progressive myopic change into objective visual discussions about abnormal ocular growth and treatment efficacy. Rather than simply explaining that a child's prescription increased, we can visually demonstrate whether ocular growth exceeds normal expectations and whether treatment is effectively slowing progression.

The annualized Growth Analysis also plays a major role in ongoing follow-up care. In our practice, myopia management is not simply about initiating treatment but continually evaluating whether treatment is effectively slowing axial elongation over time.

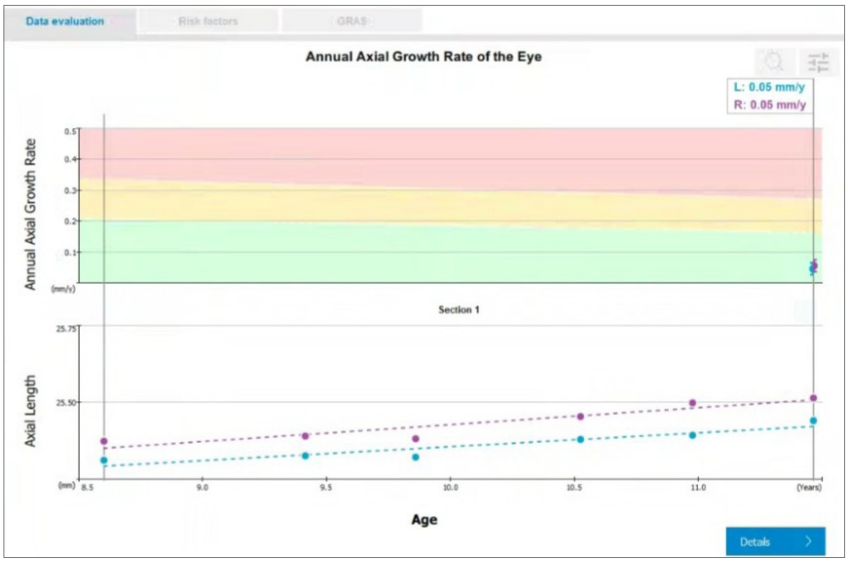


**Figure 2:** Corresponding Annualized Growth Analysis demonstrating axial elongation of 0.05 mm/year within the emmetropic (green) range

The software allows clinicians to objectively determine whether progression remains excessive despite treatment and whether modifications or combination therapy should be considered.

## Lens Design Considerations

Historically, orthokeratology lens designs were often based primarily on central keratometry values and refractive error rather than corneal topography, which frequently leads to multiple refinements to optimize the fit. While central K readings provide useful information, they represent only a small portion of the overall corneal shape, whereas orthokeratology lenses interact with a much larger area of the cornea than central keratometry values alone can accurately predict.

In our practice, the WAVE Lens Designer Software has allowed us to incorporate Pentacam® corneal tomography directly into the design process, helping us create more customized lens designs. Clinically, we have found this especially helpful in improving lens centration, treatment zone quality, and overall treatment performance while reducing troubleshooting, remakes, and chair time.

For busy practices, reducing remakes and minimizing chair time can make a meaningful difference for both the doctor and families with busy schedules. Rather than relying heavily on empirical approximations, we can use topographical data to create more precise initial lens designs with greater confidence.

From a parent communication standpoint, families are often impressed by the level of customization that goes into designing the lenses using detailed corneal tomography, which helps reinforce the data-driven and highly personalized approach to treatment.

## Case Example

An 8-year-old female presented to our practice for a myopia management consultation due to progressive myopia. Family history was significant for maternal myopia of approximately -3.00 D and paternal myopia of approximately -8.00 D.

Historical refractive progression demonstrated consistent worsening over multiple years:

| Year | OD | OS |
|---|---|---|
| 2023 | +0.75 -3.00 x010 | +0.25 -1.50 x170 |
| 2024 | -0.25 -3.00 x010 | -0.75 -1.50 x170 |
| 2025 | -0.75 -3.00 x010 [1] | -1.25 -1.50 x170 [1] |

Given the patient's progression history and strong family history of moderate-to-high myopia, the family presented highly motivated to pursue myopia management treatment.

One of the most impactful parts of the consultation occurred while reviewing the BHVI Growth Curves and Growth Analysis with the patient's parents. Prior to this visit, the family understood that the prescription was worsening, but they did not fully appreciate the significance of accelerated axial elongation, how abnormal their child's axial length was for her age, or the long-term ocular health implications associated with progressive myopia.

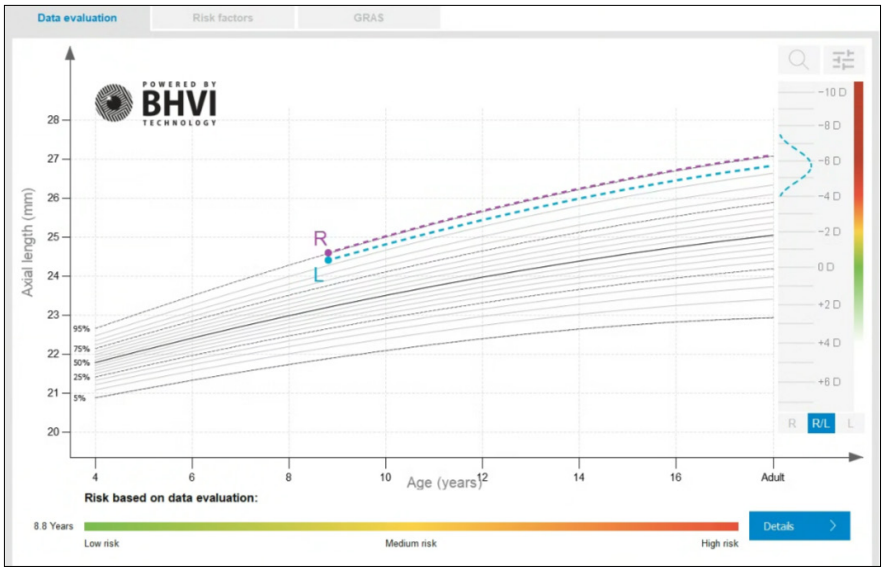


**Figure 3:** BHVI axial length growth chart demonstrating the patient's axial length measurements relative to age-matched normative ranges at the initial consultation

Using the OCULUS Myopia software, we were able to visually demonstrate the patient's progression trajectory, compare her ocular growth against expected age-matched norms, and explain why intervention was recommended at this stage.

In our experience, this type of visual data often changes the conversation from simply discussing "stronger glasses" into a much more meaningful discussion regarding ocular growth, long-term eye health, and the importance of slowing progression early.

[1] WAVE does not recommend nor support the use of its products outside of the FDA approved parameters

Orthokeratology was selected as the preferred treatment strategy, and WAVE NightLens was specifically chosen due to its freeform design capabilities and our increased confidence in managing corneal cylinder compared to many traditional orthokeratology designs. Given the patient's significant with-the-rule astigmatism, the customization capabilities of the WAVE platform provided greater flexibility in optimizing lens centration, treatment zone quality, and overall predictability.

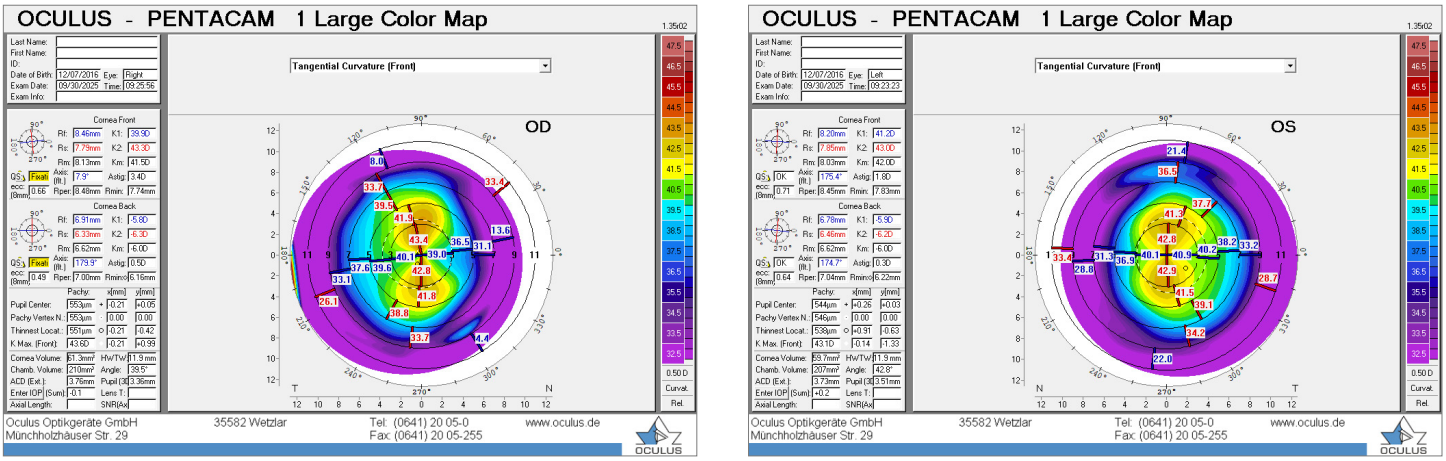


**Figure 4:** Baseline corneal tomography demonstrating significant with-the-rule corneal astigmatism prior to orthokeratology treatment planning

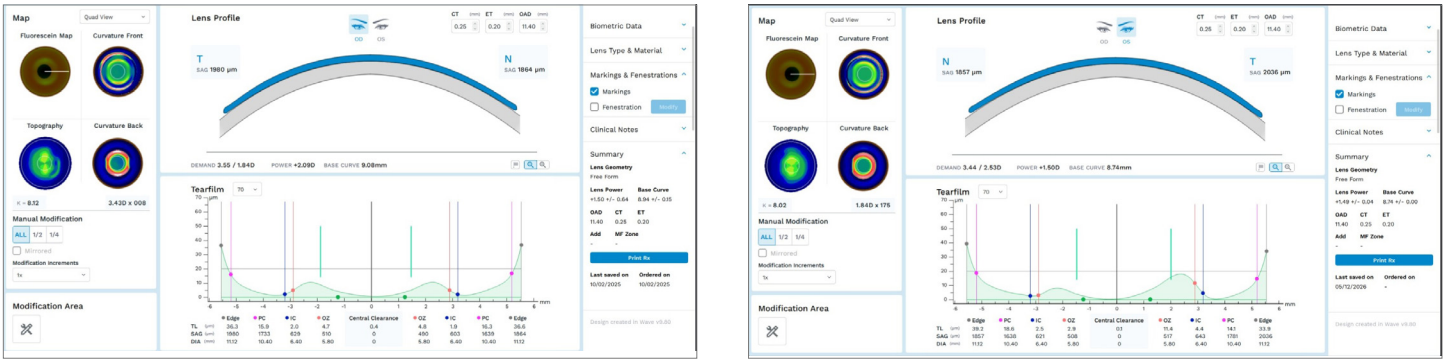


**Figure 5:** WAVE NightLens freeform orthokeratology design generated from the patient's corneal tomography

The initial lenses dispensed demonstrated excellent centration and treatment quality and was a first-fit success, which was especially encouraging given the amount of corneal cylinder present at baseline.

The patient returned two weeks later seeing 20/20-2 OD and 20/20 OS uncorrected. Refraction had improved to OD: +0.75 -1.00 x015 and OS: +0.25 DS. At her one-month follow-up visit, uncorrected acuity improved further to 20/20 OD and OS with refraction of OD: +0.75 -0.50 x010 and OS: +0.50 DS, demonstrating continued improvement in treatment quality and stability.

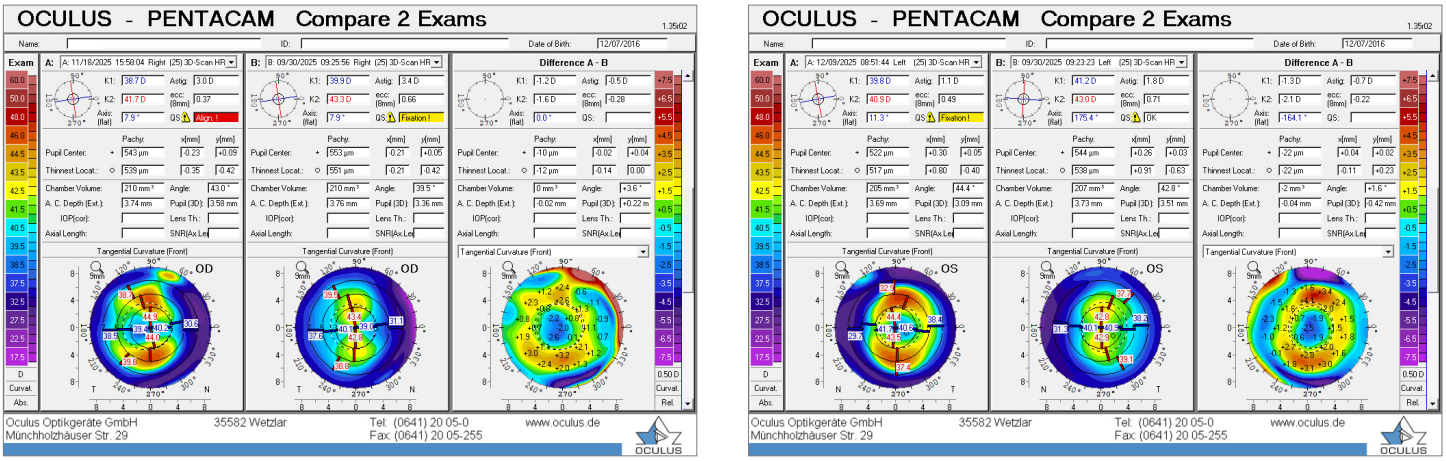


**Figure 6:** Pre- and post-treatment tomography difference maps demonstrating a well-centered treatment response and successful initial treatment outcome

## Conclusion

This case highlights the value of combining objective axial length analysis with tomography-driven orthokeratology design in pediatric myopia management. In our practice, the integration of the OCULUS Myopia software and WAVE Lens Designer Software platform has significantly improved our ability to educate families using objective data, monitor progression over time, and design more customized orthokeratology lenses with greater confidence and predictability. In this patient, the combination of BHVI Growth Analysis and WAVE freeform lens design resulted in successful first-fit treatment despite significant corneal astigmatism, while also helping facilitate more meaningful conversations regarding long-term ocular health and treatment goals.

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