News Bulletin

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AL/CR Ratio Explained

Following the release of MYAH version 1.2.0, we are excited to dive deeper into the new Axial Length to Corneal Radius (AL/CR) ratio feature, which will enhance your ability to track and manage myopia progression. This feature is particularly valuable for clinicians as it provides additional insights into the refractive status of the eye, going beyond axial length and corneal curvature in isolation.

Introduction

The Axial Length to Corneal Radius (AL/CR) ratio is emerging as a valuable biomarker in myopia management, bridging the gap between structural ocular parameters and functional refractive outcomes. By integrating two fundamental contributors to refractive error—axial elongation and corneal curvature—the AL/CR ratio offers a composite metric that more accurately reflects the eye's refractive status, especially in pediatric populations where early detection and intervention are crucial. [1]

What Is the AL/CR Ratio?

The AL/CR ratio is calculated by dividing the eye's axial length (in millimeters) by the corneal radius of curvature (also in millimeters). This dimensionless value reflects the relationship between the eye's length and refractive surface curvature. The AL/CR ratio also has prognostic value. Research shows that children with an AL/CR ratio greater than 3.0 are more likely to develop or progress in myopia. 2,3 This threshold can serve as an early warning indicator, particularly useful in school-aged children who may not yet exhibit refractive signs. In this context, the AL/CR ratio supports proactive, rather than reactive, myopia control strategies.|

Why Is It Relevant?

Clinically, the AL/CR ratio enhances decision-making by providing a more sensitive indicator of myopia risk and progression than axial length (AL), refractive error (Rx), or corneal topography alone. While axial length growth is a known driver of myopia, its interpretation without context can be limited. For example, a longer axial length may not necessarily indicate pathological myopia if accompanied by a flatter cornea. The AL/CR ratio corrects for this variability, enabling clinicians to differentiate between anatomical growth that is physiologically normal and that which signals an elevated myopia risk. [1,4,5]

The AL/CR ratio provides a more comprehensive understanding of refractive status than axial length alone. While axial length indicates the eye's size, the AL/CR ratio accounts for corneal curvature, better predicting refractive errors. Studies have shown that the AL/CR ratio correlates more strongly with spherical equivalent (SE) refractive error than

axial length alone. 1,2 In addition, a study with young Chinese adults (from 18 to 35 years old) demonstrated that the correlation between AL/CR and SE is more significant than that between AL and SE, showing that AL/CR can be potentially used to analyze the dynamic changes of SE in the development of adult myopia. [6]

Compared to cycloplegic refraction—still considered the gold standard for assessing refractive error—the AL/CR ratio provides a noninvasive, reproducible, and objective alternative that is particularly advantageous in large-scale screenings or in populations where cycloplegia is not feasible. 1,2,4 When paired with biometric devices capable of capturing both axial length and keratometry, the AL/CR ratio can be quickly calculated and incorporated into modern clinical workflows.

Moreover, the ratio lends itself well to longitudinal tracking and treatment evaluation. Its trend over time can help clinicians assess whether an intervention (e.g., orthokeratology, atropine therapy, or multifocal lenses) effectively modulates axial elongation concerning corneal morphology. By visualizing the trajectory of the AL/CR ratio alongside other metrics, clinicians can tailor treatment regimens with greater precision and confidence. However, the AL/CR ratio should not be used in isolation. It is most effective in combination with comprehensive clinical data, including age, family history, lifestyle factors (e.g., near work, outdoor activity), and detailed ocular assessments.

Conclusion

The AL/CR ratio enriches the myopia management toolkit by adding nuance and precision to patient assessment, risk stratification, and treatment planning. As biometric technology becomes more accessible and integrated into practice, this metric will likely play an increasingly central role in advancing evidence-based, individualized care for children at risk of or living with myopia.

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Best regards,

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