Review of the role of accommodation and binocular vision in myopia onset and progression

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Preference for presentation: 1st option: Lecture (30 minutes)

2nd option: Rapid Fire Communication (10 minutes)

3rd option: Poster

Abstract [currently 298, needs to be <300 words]

Background: Myopia is a multifactorial condition, and the predominant theory is that relative peripheral hyperopic defocus (RPHD) is a leading cause of myopia progression. However, interventions that reduce RPHD only slow progression by ~50%, so other factors are probably involved.

Methods: PubMed was searched for relevant keywords relating to research on myopia, accommodation and binocular vision in humans.

Results: The search identified 252 publications, with 29 added from bibliographies. After filtering, 108 publications were included.

The CLEERE study found changes in the interaction between accommodation and convergence (AC/A ratio) from four years before myopia onset and this is thought to indicate compromised accommodation, linked to increased accommodative lag. Many studies have found myopia to be associated with increased accommodative lag, that will contribute to hyperopic defocus. However, the magnitude of accommodative lag is not correlated with rate of myopia progression.

Tests of eye alignment show increased near esophoria in some myopes around the time of myopia onset. This is probably secondary to the higher AC/A ratio.

Clinical trials of bifocal and progressive addition lens spectacles show disappointing efficacy (10-30%) at slowing myopia progression. Early indications of greater efficacy in myopic children with higher accommodative lag and/or near esophoria were not replicated in later trials.

Considering previous reviews, the 2021 IMI review was dismissive of a role for accommodation and binocular vision in myopia development/progression, but the 2024 NASEM review argued that accommodation may play an underappreciated role.

Conclusion: It is not possible to reach firm conclusions from the literature. Although accommodative dysfunction seems to play some role in myopia onset,

accommodative and binocular factors are unlikely to be major causative factors in myopia progression. Interventions that modify accommodation and binocular co-ordination are unlikely to have strong myopia control effects. An additive risk factor risk-resilience model is presented.