



IMI CLINICAL SUMMARY

IMI Prevention of Myopia and its Progression

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The prevalence of myopia has markedly increased in East and Southeast Asia, and pathologic consequences of myopia, including myopic maculopathy and high myopia-associated optic neuropathy, are now one of the most common causes of irreversible blindness. Hence, strategies are warranted to reduce the prevalence of myopia and the progression to high myopia as this is the main modifiable risk factor for pathologic myopia.

PREVENTION OF MYOPIA

Increased time outdoors

- Based on published population-based and interventional studies, an important strategy to reduce the development of myopia is encouraging schoolchildren to spend more time outdoors of at least 80 minutes to 120 minutes per day.
- Compared with other measures, spending more time outdoors is the safest strategy and aligns with other existing health initiatives, for example obesity prevention, by promoting a healthier lifestyle for children and adolescents.

SLOWING MYOPIA PROGRESSION

Pharmacological measures

- Daily application of low-dose atropine eye drops, one drop per eye, in concentrations ranging between 0.01% and 0.05% were clinically useful.
- The 0.05% atropine eye drop slowed the progression of myopia greatest compared to 0.01% and 0.025%.
- The two-year LAMP study reported the mean myopic refractive error progression was 0.55 ± 0.86 D, 0.85 ± 0.73 D, and 1.12 ± 0.85 D in the 0.05%, 0.025%, and 0.01% atropine groups, respectively ($P=0.015$, $P<0.001$, and $P=0.02$, respectively, for pairwise comparisons). Mean axial length changes were 0.39 ± 0.35 mm, 0.50 ± 0.33 mm, and 0.59 ± 0.38 mm ($P=0.04$, $P<0.001$, and $P=0.10$, respectively).
- Patients should be monitored for potential side effects including slightly reduced amplitude of accommodation, mydriasis and risk of an allergic reaction.

Optical treatments

Multifocal spectacle lenses

- Defocus Incorporated Multiple Segments (DIMS) spectacle lenses significantly slowed myopia progression and axial elongation in myopic children after two years in Chinese children aged 8-13 years, average myopic progression over 2 years was lower in the DIMS group (-0.41 ± 0.06 D) than in the control group wearing single vision spectacle lenses (-0.85 ± 0.08 D).
- Other spectacle lens designs such as the Zeiss MyoVision lens showed less efficacy in the studies so far.

Dual-focus and multifocal contact lenses

- These include a variety of contact lenses with either a center-distance design, concentric rings of distinct zones of relative plus power, or a gradient design with increasing relative plus power toward the lens periphery. They have demonstrated a reduction in myopia progression on average of 36.4% and a decrease in axial elongation by 37.9%.
- The MiSight soft contact lens (clear center distance and concentric rings of relative plus power) is the first U.S. Food and Drug Administration approved commercially available daily wear, single use multifocal contact lens (MiSight®, CooperVision Inc., Lake Forest, CA, USA) for slowing the progression of myopia in children. The change in spherical equivalent refractive error over a 3-year period was -0.51 ± 0.64 vs. -1.24 ± 0.61 D (59% reduction) in the study group and control group, respectively. Mean change in axial length was 0.30 ± 0.27 mm vs. 0.62 ± 0.30 mm (52% reduction).
- The BLINK (Bifocal Lenses in Nearsighted Kids) study reported that a high add (+2.50 D) was more efficacious than the medium add (+1.50 D) and single-vision. The difference in the adjusted 3-year myopia progression between the high add power group versus the single-vision group was -0.46 D (95% CI: $-0.63, -0.29$) and -0.23 mm (95% CI: $-0.30, -0.17$), between the high add power group versus the medium add power group was -0.30 D (95% CI: $-0.47, -0.13$) and -0.16 mm (95% CI: $-0.23, -0.09$), and between the medium add power group versus the single-vision group was -0.16 D (95% CI: $-0.33, 0.01$) and -0.07 mm (95% CI: $-0.14, -0.01$).
- Questions remain about the optimum distribution of the refractive power across the lens to maximize the slowing of myopia progression to provide functional vision, and whether, now there is a regulatory approved contact lens on the market, off-label use of multifocal presbyopic designs should stop.

Orthokeratology (OK)

- Orthokeratology lenses are worn overnight to flatten the central cornea, leading to mid-peripheral steepening and providing peripheral myopic defocus, while eliminating daytime myopia.
- OK is more effective in slowing myopia in younger, more rapidly progressing myopic children and in high myopia (partial OK).
- Toric OK was also effective in slowing myopia in moderate to high corneal astigmatism.
- With respect to any therapy applying contact lenses, in particular OK lenses, there are potential complications. The most severe one is microbial keratitis (though rare).

GENERAL CONSIDERATIONS AND LIMITATIONS

- The risk to benefit ratio needs to be weighed up for the individual based on the individual's age, health, and lifestyle, before prescribing and during the treatment.
- The measures listed above are not mutually exclusive and may act on different mechanisms of myopia development and progression.
- The availability of the treatments may vary according to the region and scope of practice.
- Studies are now beginning to examine combining treatments, and in future combining treatments may become more common.

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REFERENCE

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