Augendetektiv®

FORSCHUNG LEHRE ENTWICKLUNG

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Optionen des Myopie Managements

The Optics Conference
by eyebizz
9. & 10. Juni 2023
Dorint Kongresshotel Mannheim

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Offenlegung

Dr. Michael Bärtschi

is a paid consultant for :

HAAG-STREIT, Schweiz

FALCO Kontaktlinsen, Schweiz

COOPER Vision, UK

However:

The following impressions reflects our own decision-making process and experiences made by our entire eyeness® team, unaffected from HAAG-STREIT, FALCO or COOPER Vision.

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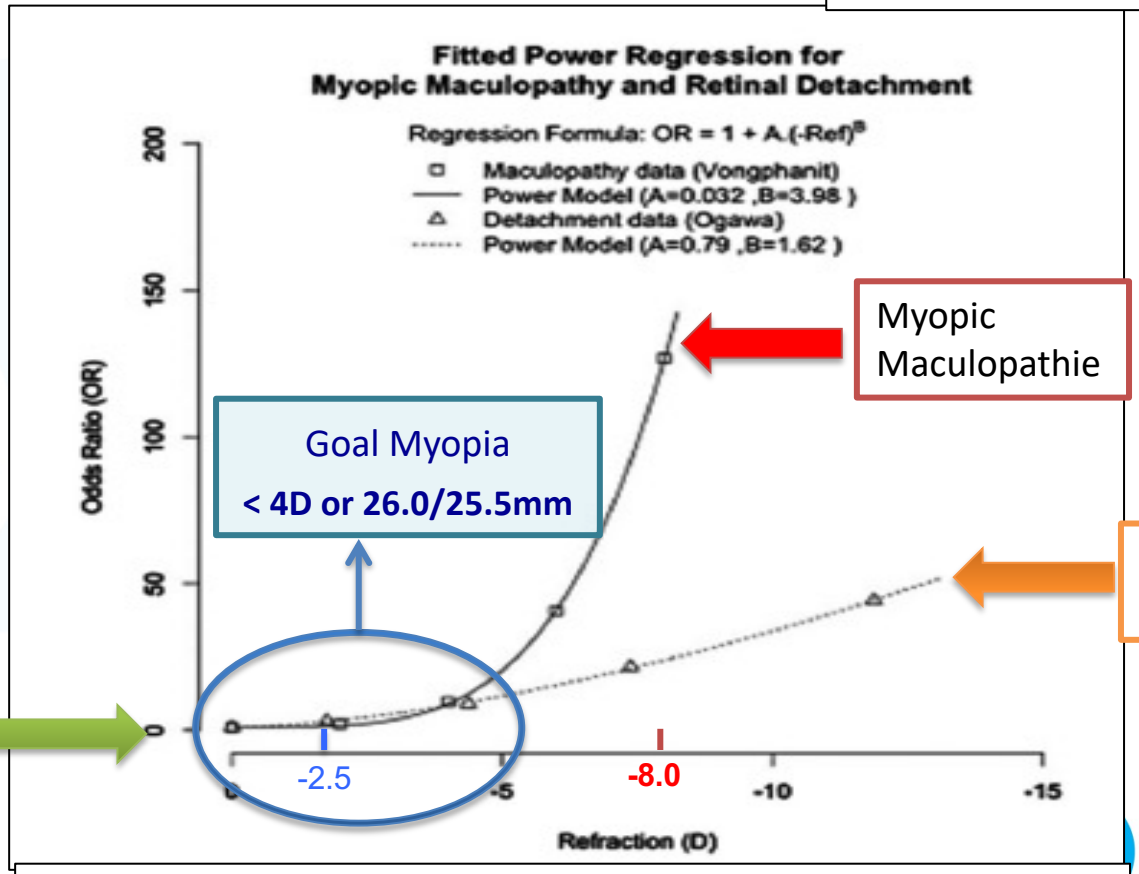
Risk (Odds)Ratio

AMERICAN ACADEMY OF OPHTHALMOLOGY
Eye & Contact Lens • Volume 44, Number 4, July 2018
2018
REVIEW ARTICLE
OPEN

A Review of Current Concepts of the Etiology and Treatment of Myopia

Jeffrey Cooper, M.S., O.D., F.A.A.O. and Andrei V. Tkatchenko, M.D., Ph.D.



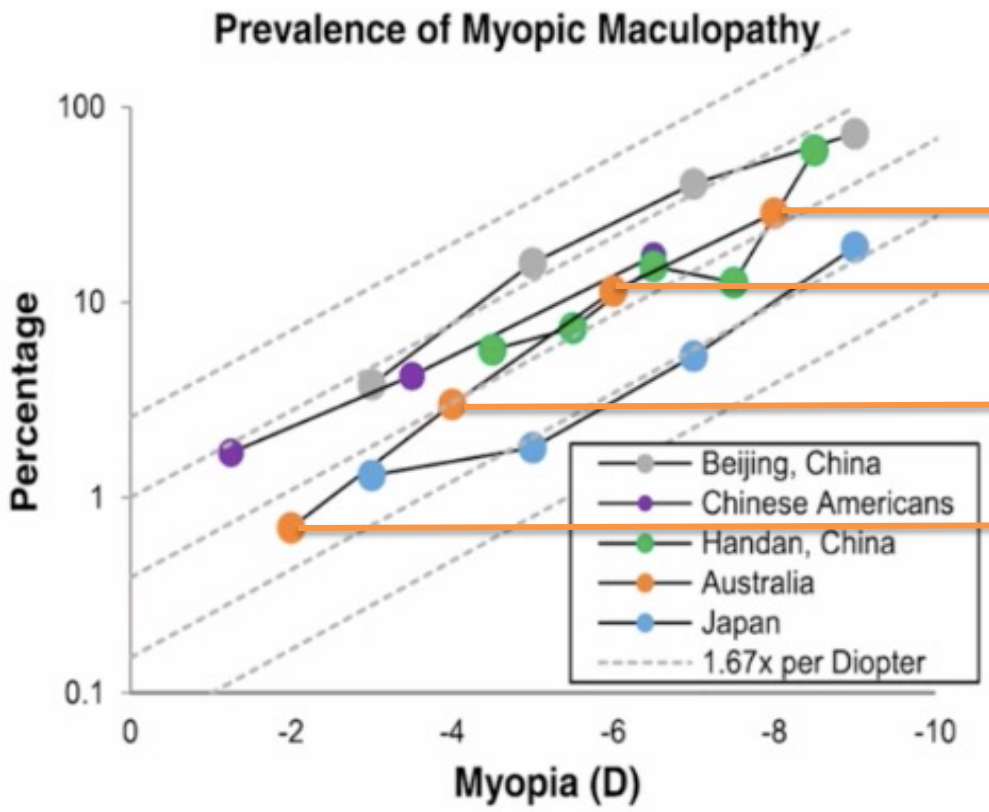
Hochmyop > 60y:

Amotio	12x
MM	845x

Haarman et al. IOVS 2020 Apr 9;61(4):49
The complications of myopia: A Review and Meta-Analysis

The Myopia Epidemic

Bullimore & Brennan et al. OptomVisSci 2019



30 %

10 %

4 %*

0.8 %

* Prävalenz Glaukom

Bullimore & Brennan et al. Optom Vis Sci 2019

Global Vision Summit 2021

FOR THOUGHT LEADERS WORLDWIDE

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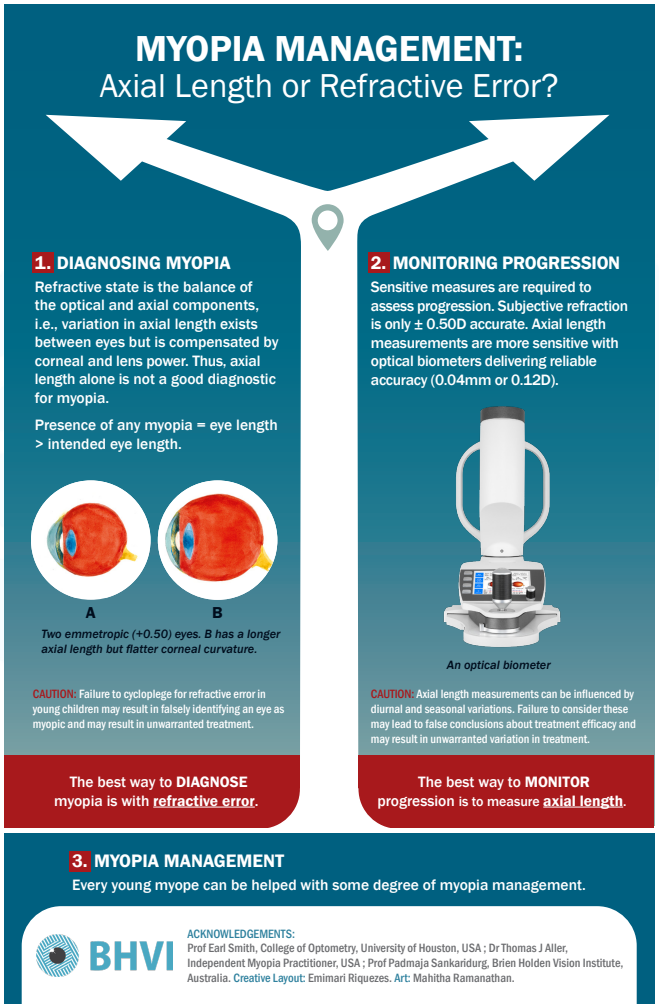
Diagnose und Nachsorge



Review

2021

EJO European Journal of Ophthalmology

Update and guidance on management of myopia. European Society of Ophthalmology in cooperation with International Myopia Institute

European Journal of Ophthalmology
1–31

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Treatment duration

Axial length is the most important metric to monitor in pre-myopic and myopic children.[93,285,334,337,338]

Myopia generally progresses most rapidly during pre-teenager years (7–12 years), subsequently slowing through adolescence and adulthood.[67,91,354] The mean age of myopia stabilization is around 15.6 years of age, and 95% of myopes stabilize by age of 24 years.[83]

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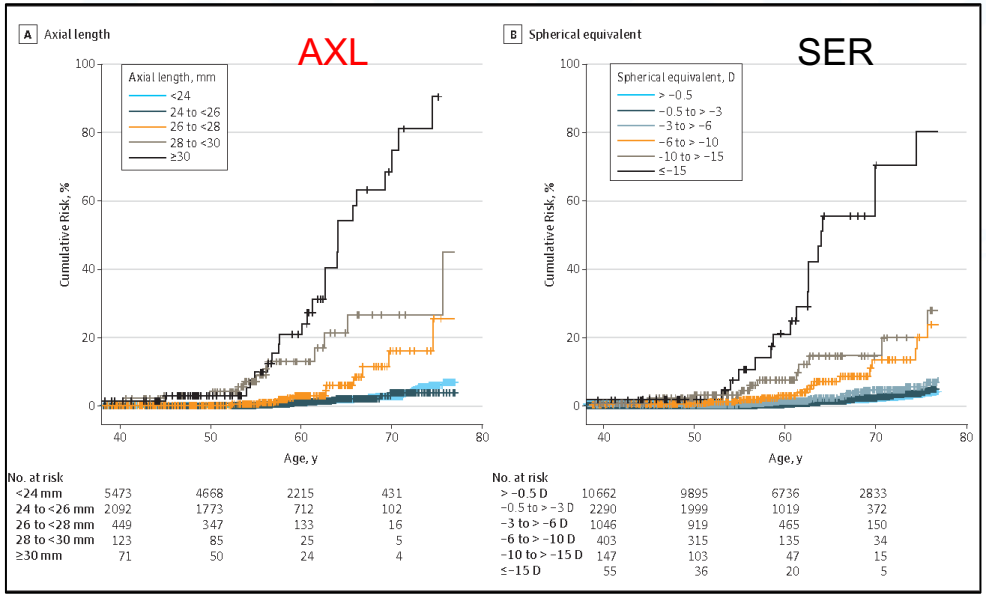
Diagnose und Nachsorge

JAMA Ophthalmology | Original Investigation 2016;134(12):1355-1363

Association of Axial Length With Risk of Uncorrectable Visual Impairment for Europeans With Myopia

J. Willem L. Tideman, MD; Margaretha C. C. Snabel, MD; Milly S. Tedja, MD; Gwyneth A. van Rijn, MD; King T. Wong, MD; Robert W. A. M. Kuijpers, MD, PhD; Johannes R. Vingerling, MD, PhD; Albert Hofman, MD, PhD ; Gabriëlle H. S. Buitendijk, MD; Jan E. E. Keunen, MD, PhD; Camiel J. F. Boon, MD, PhD; Annette J. M. Geerards, MD; Gregorius P. M. Luyten, MD, PhD; Virginie J. M. Verhoeven, MD, PhD; Caroline C. W. Klaver, MD, PhD



No. at risk

<24 mm	5473	4668	2215	431
24 to <26 mm	2092	1773	712	102
26 to <28 mm	449	347	133	16
28 to <30 mm	123	85	25	5
≥30 mm	71	50	24	4

No. at risk

> −0.5 D	10 662	9895	6736	2833
−0.5 to > −3 D	2290	1999	1019	372
−3 to > −6 D	1046	919	465	150
−6 to > −10 D	403	315	135	34
−10 to > −15 D	147	103	47	15
≤−15 D	55	36	20	5

Axial length	Odds ratio of vision impairment by age 60	Prevalence of vision impairment by age 75
24 - 26 mm	1 (reference)	4%
26 – 28 mm	2 x risk	25%
28 – 30 mm	11 x risk	27%
30 mm +	25 x risk	90%

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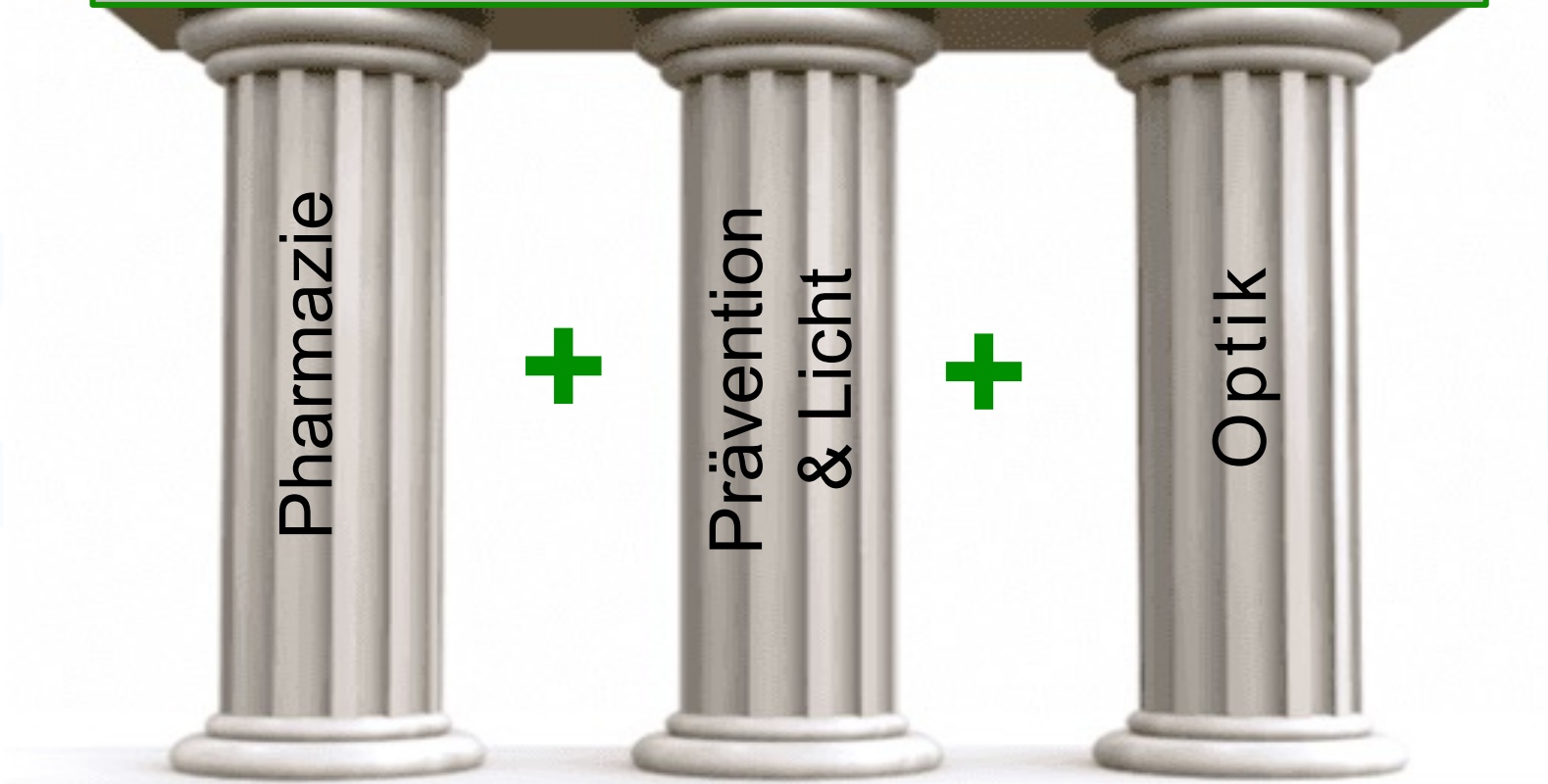
Das Myopie Schutzkonzept

Kooperation und Nachsorge



Pharmazie	Prävention & Licht	Optik
Atropin 0.01-0.05% / 0.5%	Freiluft LLRL Tx	PD Gläser & Kontaktlinsen
Alter: 4 – 10+	**0 – 20+**	**0/6 – 20+**

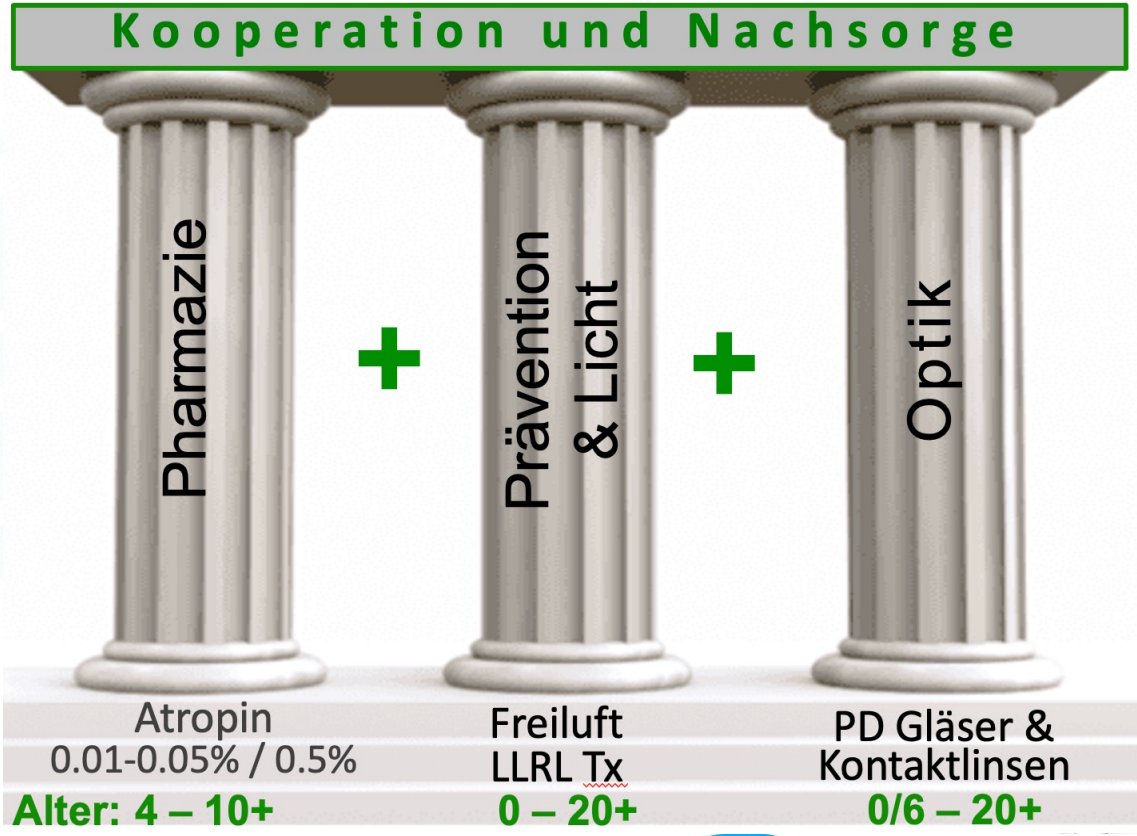
Das Myopie Schutzkonzept

AKTUELL: Drei Säulen Model

- Pharmazeutische Therapie (Atropin)
- Lifestyle Anpassung (Outdoor, Naharbeitsdistanz /-zeit, Licht Tx)
- Optische Hemmung (KL und Brillen)
- *Weitere Faktoren*

  Binokularsehen (Nahesophorie)

  Akkommodationsschwäche



Individuelles & adaptives Management !

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Guidelines 2021-22:

- IMI (International Myopia Institute)
- AAO (American Academy of Ophthalmology)
- ESO (European Society of Ophthalmology)
- ECOO (European Council Optometry & Optics)

ECOO

European Council of Optometry and Optics
Conseil Européen de l'Optométrie et de l'Optique
Europäischer Rat für Optometrie und Optik

Position Paper

Myopia management: a comprehensive approach

September 2022

INTERNATIONAL MYOPIA INSTITUTE®

ZUSAMMENFASSUNG ALLER KLINISCHEN

IMI Leitlinien zur Behandlung von Kurzsichtigkeit

Monica Jong PhD BOptom
Executive Director IMI
Brien Holden Vision Institute Sydney, Visiting Fellow School of Optometry and Vision Science, University of New South Wales, Sydney, Australia.

Kate L. Gifford BAppSc(Optom) PhD
IMI Committee Chair
Private Practice and Queensland University of Technology, Australia

AMERICAN ACADEMY OF OPHTHALMOLOGY®

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

Bobeck S. Modjtahedi, MD,[1,2] Richard L. Abbott, MD,[3] Donald S. Fong, MD,[1,2] Flora Lum, MD,[4] Donald Tan, MD,[5] on behalf of the Task Force on Myopia

Review

EJO European Journal of Ophthalmology

Update and guidance on management of myopia. European Society of Ophthalmology in cooperation with International Myopia Institute

European Journal of Ophthalmology
1–31

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Ziel des Myopie Management

Die **kontrollierte** Anwendung **präventiver** Maßnahmen,

zur **nachhaltigen Hemmung** des **Längenwachstums** des

Auges, zwecks **Minimierung** krankhafter **Folgeschäden.**

Definition Michael Bärtschi seit 2012

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Infographik IMI publiziert 25. August 2021

INTERNATIONAL MYOPIA INSTITUTE

International Myopia Institute (IMI) Facts and Findings

mind. 80-240 Mio

myopiainstitute.org

D 800‘000

Impact of myopia

2400 Mio

2020
Myopia affects almost
30% of the world's population

2050
Myopia is estimated to affect
50%
High myopia will affect
10% of the world's population

800 Mio

Risk of vision impairment
Uncorrected myopia is a leading cause of avoidable vision impairment. Complications associated with high myopia can be sight threatening e.g. myopic macular degeneration.

Education
In children, poor vision or uncorrected vision can impact scholastic performance and result in psychosocial stress. Negative attitudes to spectacle wear may also affect psychosocial well-being.

Quality of Life (QOL)
Reduced QOL has been demonstrated for myopia and myopia-related complications. QOL is impacted whether myopia is corrected or uncorrected and varies according to the type of corrective modality worn.

Economic impact
Given the progressive nature of myopia, direct costs (expenditure on diagnosis, correction/management, transport and treatment of morbidity) and lost productivity costs are substantial.

Risk factors

Higher levels of education and near work

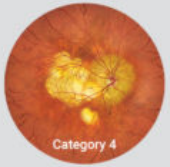
Less time outdoors

- East Asian ethnicity
- Parents with myopia
- Girls more susceptible according to some studies

Binocular vision

- Link with myopia development is unclear
- Important to optimize binocular vision in children to provide a single clear image

Pathologic myopia



META-PM classification system

Category	Retinal signs
0	No myopic retinal lesions
1	Tessellated (or tigroid) fundus
2	Diffuse choroidal atrophy
3	Patchy choroidal atrophy
4	Macular atrophy
Plus lesion	Lacquer cracks, myopic choroidal neovascularization, Fuchs spot
Posterior staphyloma	—

3% of the world's population **is affected by pathologic myopia**

1-3% Asians | **1%** Europeans

Affects **50-70%** of those with high myopia

Increases with age and spherical equivalent

Increases in prevalence and severity 40+ years

Management options – Reported treatment effectiveness varies with age of initiation, treatment duration as well as demographic/environmental factors.*

Prevention

80 to 120 minutes outdoors **daily**

Pharmacological option

Atropine LAMP Study
2 years

0.01%	ΔSphE 1.12 D, ΔAL 0.59 mm
0.025%	ΔSphE 0.85 D, ΔAL 0.50 mm
0.05%	ΔSphE 0.55 D, ΔAL 0.39 mm

Total average change in SphE and AL over two years.

Slowing progression – Spectacle and contact lens treatments typically impose myopic defocus on a local retinal region

Spectacle options

Highly Aspherical Lenslets (HAL)
2 years
ΔSphE 0.80 D (55%)
ΔAL 0.35 mm (51%)

Defocus Incorporated Multiple Segments (DIMS)
2 years
ΔSphE 0.44 D (52%)
ΔAL 0.34 mm (62%)

Peripheral Hyperopia Reduction Lens
2 years
ΔSphE 0.04 D (3%)
ΔAL 0.04 mm (5%)
ΔSphE 0.29 D (30%) and ΔAL 0.09 mm (18%) with one design after 1 year in younger children with myopic parents

Executive prismatic bifocals
3 years
ΔSphE 1.05 D (51%)
ΔAL 0.28 mm (34%)

Progressive Addition Lens (PALS)*
2 years
ΔSphE 0.14 D (24%)
ΔAL 0.04 D (28%)

Contact lens options

Dual-focus
3 years
ΔSphE 0.73 D (59%)
ΔAL 0.32 mm (52%)
US FDA approved

Extended depth of focus
2 years
ΔSphE 0.37 D (32%)
ΔAL 0.46 mm (25%)

Center distance
3 years
ΔSphE 0.46 D (44%)
ΔAL 0.23 mm (35%)

Soft contact lenses - worn daily

Orthokeratology*
2 years
ΔAL 0.27 mm (45%)
Worn overnight

* See IMI white papers for details of recent study results quoted. Note: The relationship of AL and SphE varies with level of myopia. * Meta-analysis

Δ= reduction in average progression compared to control group; **SphE** = spherical equivalent refractive error; **AL** = axial length

Authors: Monica Jong, James Wolffsohn, Christine Wildsoet, Jost Jonas, Ian Morgan, Nicola Logan, Kyoko Ohno-Matsui, Padmaja Sankaridurg, Serge Resnikoff.

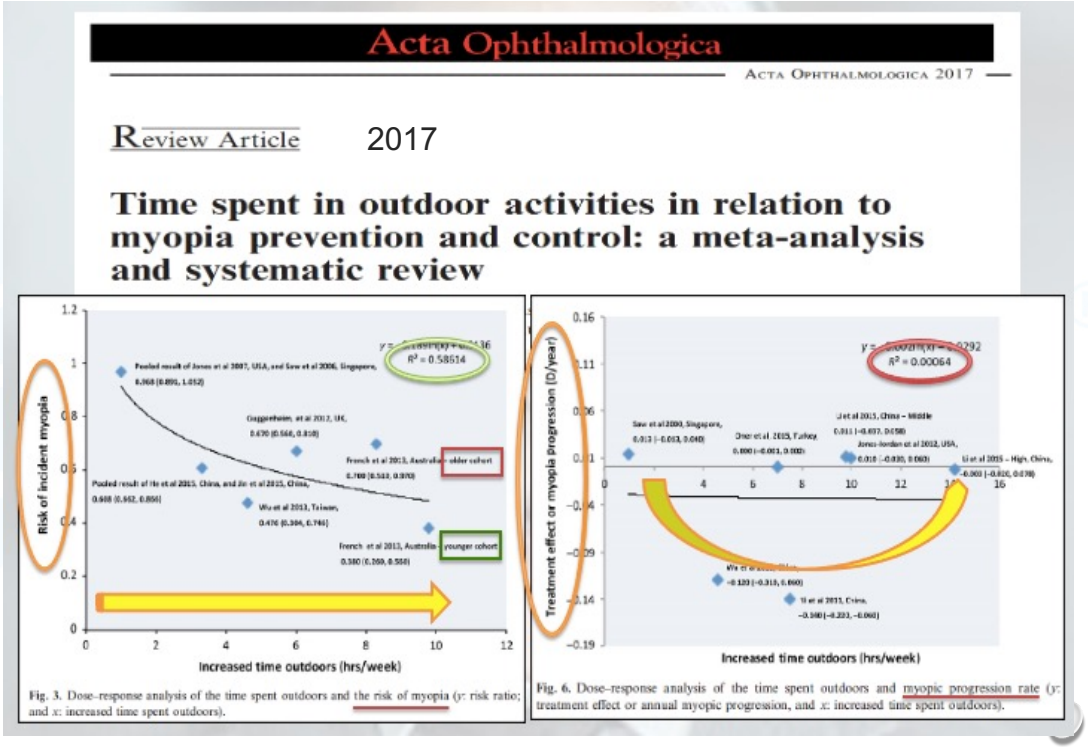
Source: IMI white papers 2019, 2021 https://myopiainstitute.org/imi-white-papers/
Investigative Ophthalmology & Visual Science IMI special issues 60(3) 2019 and 62(5) 2021

Myopie Management Prävention (Tageslicht)

Während der frühkindlichen Phase des Augenwachstums vom hyperopen zum emmetropen Auge (Emmetropisierung Phase), kann ein vermehrter Aufenthalt im hellen Freien die **Wahrscheinlichkeit** des Auftretens einer Myopie reduzieren.

Jedoch paradoxerweise kaum mehr weiter hemmen sobald das Auge bereits myop ist !

(Treatment effect on myopia progression)



Xiong et al. Time spend in outdoors activities in relation to myopia prevention and control. Acta Ophthalmologica 2017

Myopie Management Prävention (Tageslicht)

AMERICAN ACADEMY OF OPHTHALMOLOGY®

Ophthalmology Vol 129/11 2022

Time Outdoors in Reducing Myopia

A School-Based Cluster Randomized Trial with Objective Monitoring of Outdoor Time and Light Intensity

Xiangui He, PhD,[1,2] Padmaja Sankaridurg, PhD,[3,4] Jingjing Wang, PhD,[1] Jun Chen, PhD,[1] Thomas Naduvilath, PhD,[3,4] Mingguang He, PhD,[5,6] Zhuoting Zhu, PhD,[5] Wayne Li, MD,[3,4] Ian G. Morgan, MD,[7] Shuyu Xiong, PhD,[2] Jianfeng Zhu, MD,[1] Haidong Zou, MD,[1,2] Kathryn A. Rose, MD,[8] Bo Zhang, MS,[1] Rebecca Weng, GD,[3,4] Serge Resnikoff, MD,[3,4] Xun Xu, MD[1,2]

Keine direkte Dosisabhängigkeit feststellbar: Kontrollgruppe < Gr. 1 > Gr. 2

$P = 0.001$). Furthermore, the protective effects of outdoor time on myopic shift in SE and AL were observed only in nonmyopes ($P = 0.023$ and 0.002 for SE and AL) but not in those who were already myopic ($P = 0.410$ and 0.335, respectively). In comparing those already myopic with

Myopie Management Prävention (Tageslicht)

Received: 28 August 2021 | Accepted: 4 December 2021
DOI: 10.1111/opo.12945

REVIEW ARTICLE
Special Issue Article

OPO THE COLLEGE OF OPTOMETRISTS
Ophthalmic Physiol Opt. 2022;00:1–14.

Time spent outdoors as an intervention for myopia prevention and control in children: an overview of systematic reviews

Rohit Dhakal[1,2] | Rakhee Shah[2] | Byki Huntjens[2] | Pavan K Verkicharla[1] | John G Lawrenson[2,*]

Conclusion: This overview found that increased exposure to outdoor light reduces myopia development. However, based on annual change in SER and AL, there is insufficient evidence for a clinically significant effect on myopia progression. The poor methodological quality and inconsistent reporting of the included systematic reviews reduce confidence in the estimates of effect.

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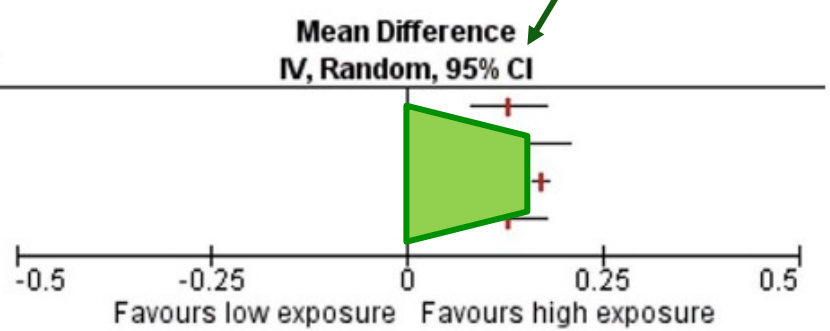
Myopie Management Prävention (Tageslicht)

TABLE 5 Change in spherical equivalent refractive error reported in included systematic reviews and meta-analyses

Review study	Number of subjects (Number and design of primary studies)	Duration of effect (years)	Measure of effect (D), MD (95% CI)	Measure of effect standardised to 1 year (D) MD (95% CI)	Direction of effect
Xiong et al.[24]	2,865 (3, CT)	3	0.30 (0.18, 0.41)	0.13 (0.08, 0.18)	Favours high outdoor exposure
Ho et al.[22]	4,406 (6, CT)	1	0.15 (0.09, 0.22)	0.15 (0.09, 0.22)	Favours high outdoor exposure
Cao et al.[25]	2,729 (4, CT)	NI	0.17 (0.16, 0.18)	0.17 (0.16, 0.18)	Favours high outdoor exposure
Deng and Pang[26]	3,272 (5, CT)	1	0.13 (0.08, 0.18)	0.13 (0.08, 0.18)	Favours high outdoor exposure

Abbreviations: CI, Confidence interval; CT, Clinical trials; D, Dioptres; MD, Mean difference.

Study or Subgroup	Mean Difference IV, Random, 95% CI
Xiong et al.24	0.13 [0.08, 0.18]
Ho et al.22	0.15 [0.09, 0.21]
Cao et al.25	0.17 [0.16, 0.18]
Deng and Pang 26	0.13 [0.08, 0.18]



Cave Emmetropisierung: 0.75 - > 1dpt / Jahr

Quelle: Truckenbrod et al, LIFE, OCL Juni 2021

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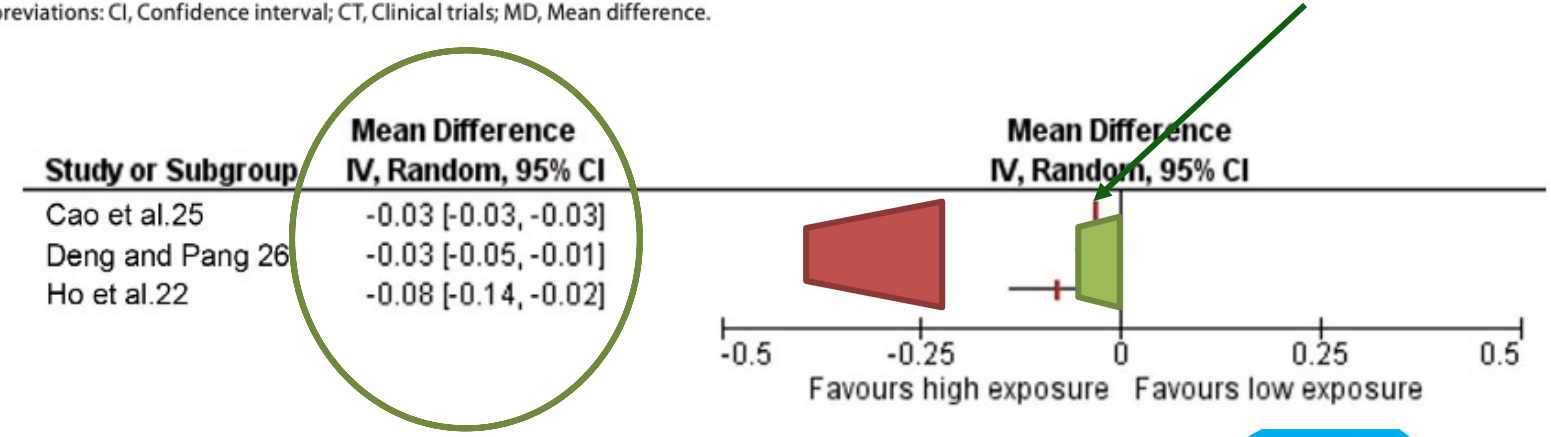
Myopie Management Prävention (Tageslicht)

TABLE 6 Change in axial length reported in included systematic reviews and meta-analyses

Review study	Number of subjects (Number and design of primary studies)	Duration of effect (years)	Measure of effect (mm) (95% CI)	Direction of effect
Deng and Pang[26]	2,658 (3, CT)	1	MD −0.03 (−0.05, 0.00)	Favours high outdoor exposure
Cao et al.[25]	2,658 (3, CT)	NI	MD −0.03 (−0.03, −0.03)	Favours high outdoor exposure
Ho et al.[22]	3,903 (4, CT)	1	MD −0.08 (−0.14, −0.02)	Favours high outdoor exposure

Abbreviations: CI, Confidence interval; CT, Clinical trials; MD, Mean difference.



Cave Emmetropisierung: 0.22 – 0.35mm / Jahr

Quelle: Truckenbrod et al, LIFE, OCL Juni 2021

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Myopie Management Pharmazie

- Atropin Augentropfen zeigen in klinischen Studien eine hohe Wirksamkeit zur Hemmung des Augenlängenwachstums. (z.B. ATOM oder LAMP Studien usw)
- Sie sind zudem einfach in der Anwendung und haben bereits in relativ (!) niedriger Dosierung ein sehr gutes (niedriges) Risikoprofil.

Eye (2016) 30, 998–1004

www.nature.com/eye

Effectiveness study of atropine for progressive myopia in Europeans

JR Polling[1,2], RGW Kok[1], JWL Tideman[1,3], B Meskat[1] and CCW Klaver[1,3]

Atropin 0.5% !

Achtung starke Nebeneffekte => Phototrope Gleitsichtgläser !

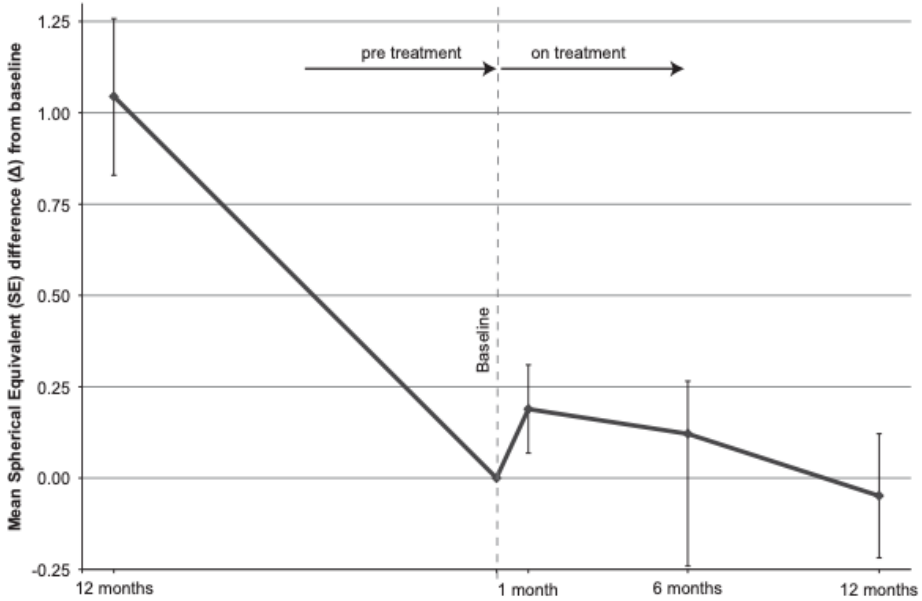

Figure 1 Mean change in SE from baseline 1 year before and during the year of treatment. Error bars present 95% CI.

Myopie Management Pharmazie

Effekt mit Atropin LAMP 3

AMERICAN ACADEMY OF OPHTHALMOLOGY® 2021

Three-Year Clinical Trial of Low-Concentration Atropine for Myopia Progression Study: Continued Versus Washout

Phase 3 Report

Jason C. Yam, FCOphthHK, FRCSEd(Edin),[1,2,3,4,5] Xiu Juan Zhang, PhD,[1] Yuzhou Zhang, MSc,[1] Yu Meng Wang, PhD,[1] Shu Min Tang, PhD,[1,6] Fen Fen Li, PhD,[1,7] Ka Wai Kam, FCOphthHK, FHKAM (Ophthalmology),[1,3] Simon T. Ko, FCOphthHK, FHKAM (Ophthalmology),[5,8] Benjamin H.K. Yip, PhD,[9] Alvin L. Young, FRCSI,[1,3] Clement C. Tham, FCOphthHK, FRCOphth,[1,2,3,4] Li Jia Chen, FCOphthHK, PhD,[1,3,4] Chi Pui Pang, Dphil[1,4]

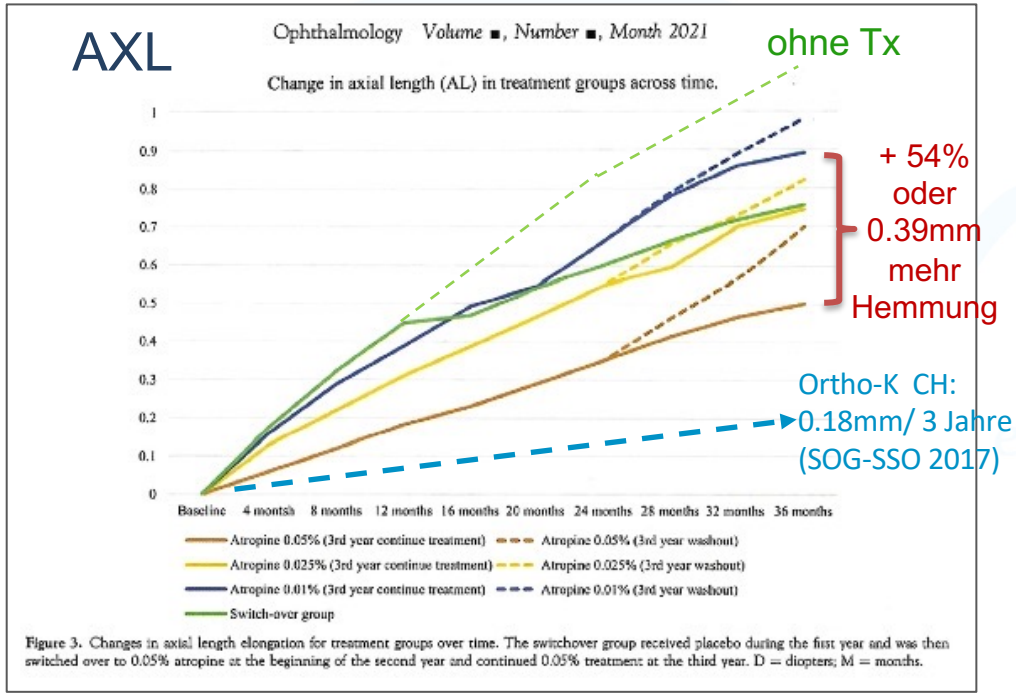

Figure 3. Changes in axial length elongation for treatment groups over time. The switchover group received placebo during the first year and was then switched over to 0.05% atropine at the beginning of the second year and continued 0.05% treatment at the third year. D = diopters; M = months.

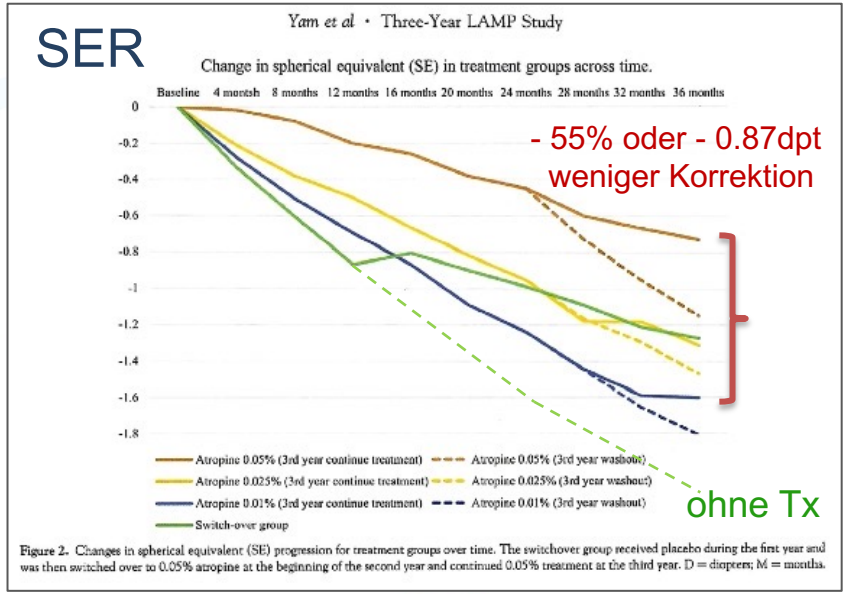

Figure 2. Changes in spherical equivalent (SE) progression for treatment groups over time. The switchover group received placebo during the first year and was then switched over to 0.05% atropine at the beginning of the second year and continued 0.05% treatment at the third year. D = diopters; M = months.

Wirkung : Atropin 0.05% >> 0.01%

aber ! „Rebound“ 0.05% >> 0.01%

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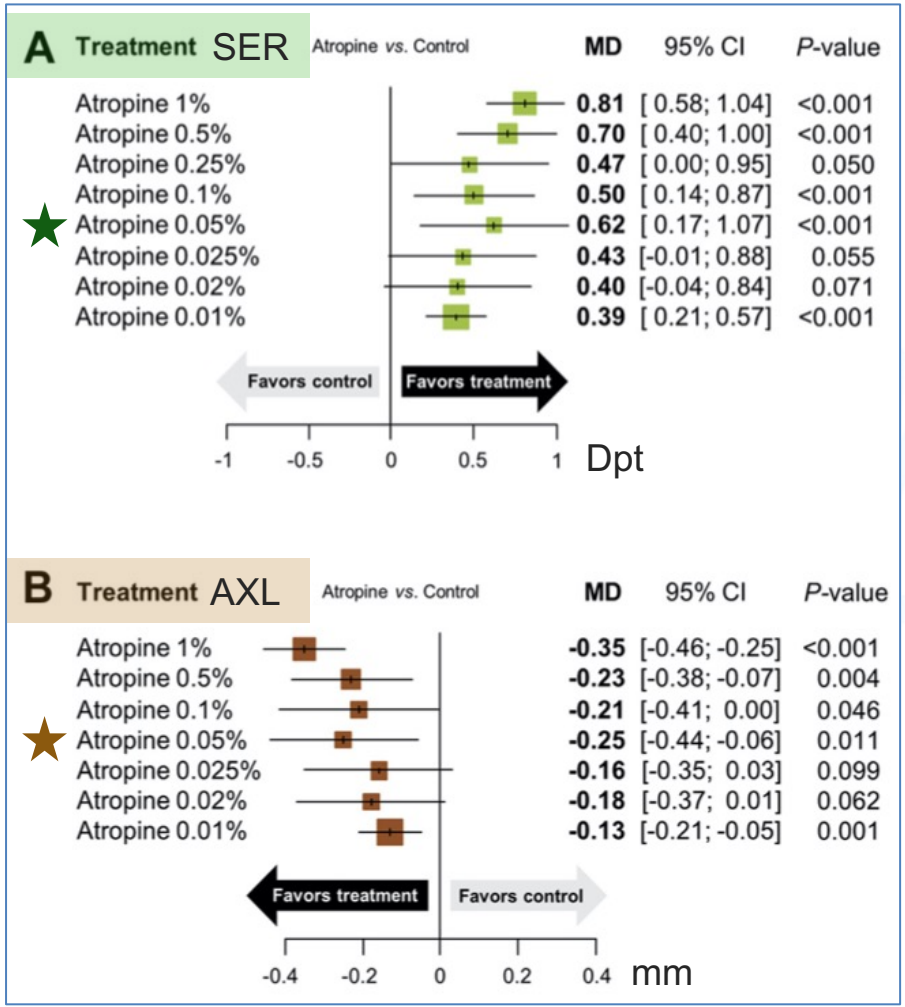
Myopie Management Pharmazie



AMERICAN ACADEMY OF OPHTHALMOLOGY®

2021

Efficacy and Safety of 8 Atropine Concentrations for Myopia Control in Children

A Network Meta-Analysis

Ahnul Ha, MD,[1,2,3] Seong Joon Kim, MD, PhD,[1,4] Sung Ryul Shim, MPH, PhD,[5] Young Kook Kim, MD,[1,4,] Jae Ho Jung, MD, PhD[1,4,*]*

Bestes Nutzen / Risiko Verhältnis
Atropin 0.05 %

Nebenwirkungen !

Bei hellen Augen evt. zuerst mit 0.02 / 0.025 % starten

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Optisches Myopie Management
Brillengläser & Kontaktlinsen

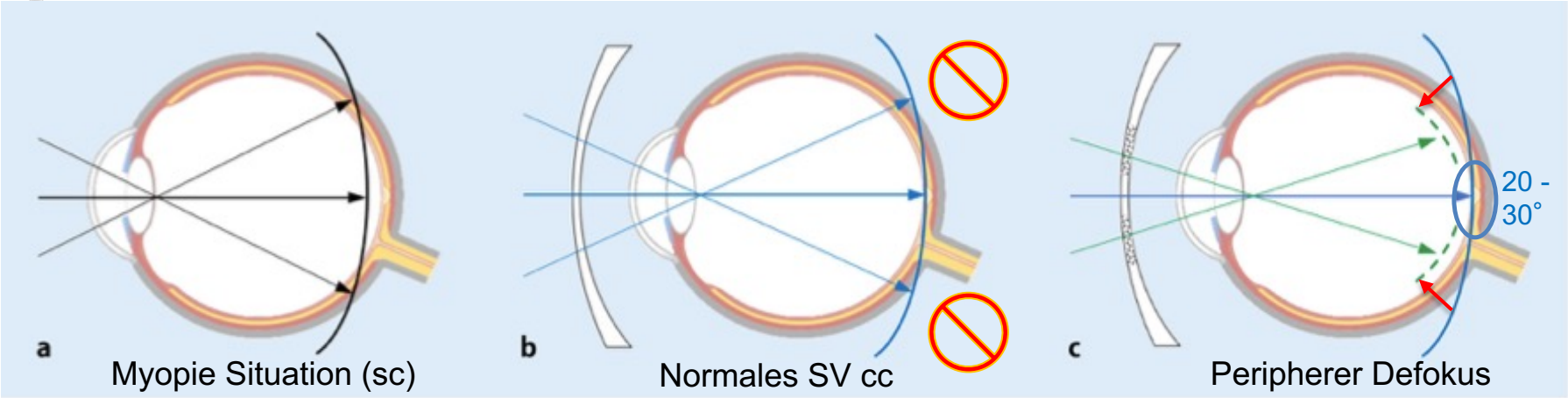

Abb. 1 ▲ Schematische Darstellung der optischen Verhältnisse im Auge (nicht maßstabsgetreu): **a** Bei unkorrigierter Myopie liegt die Bildschale zentral vor der Netzhaut und in der Peripherie zum Teil hinter der Netzhaut. **b** Durch Korrektur mit einem herkömmlichen Brillenglas wird die Fokusebene der optischen Abbildung (Bildschale) verschoben, wodurch sie zentral im Bereich der Fovea auf der Netzhaut, in der Peripherie allerdings hinter der Netzhaut liegt (hyperoper Defokus). **c** Bei Korrektur mit den DIMS-Gläsern liegt der zentrale Bereich der Bildschale auf der Netzhaut. Die DIMS-Linsen erzeugen in der Peripherie zusätzliche einzelne Brennpunkte, die vor der Netzhaut liegen (myoper Defokus, Diffusion).
auf

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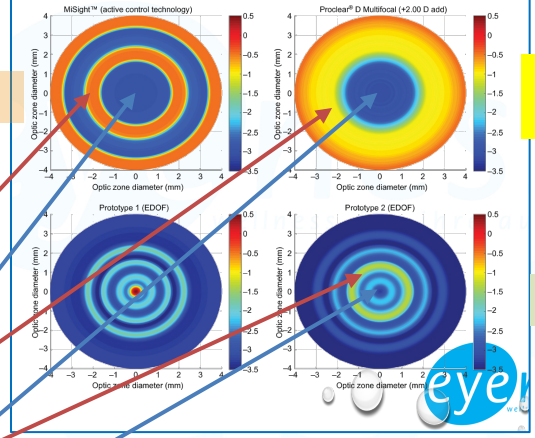
Myopie Management mit Kontaktlinsen

Das Myopie Management mittels Kontaktlinsen besteht aktuell aus zwei hauptsächlichen Methoden:

- Kontaktlinsen mit peripherem Defokus (weiche oder stabile KL)
- Orthokeratologie (stabile KL)

Dualfocus / EDOF / DC



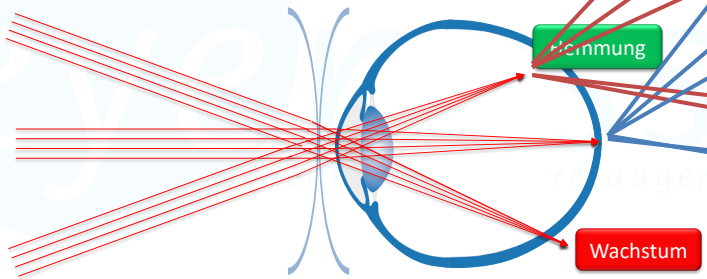
MiSight

Biofinity multi / Proclear multi

MYLO

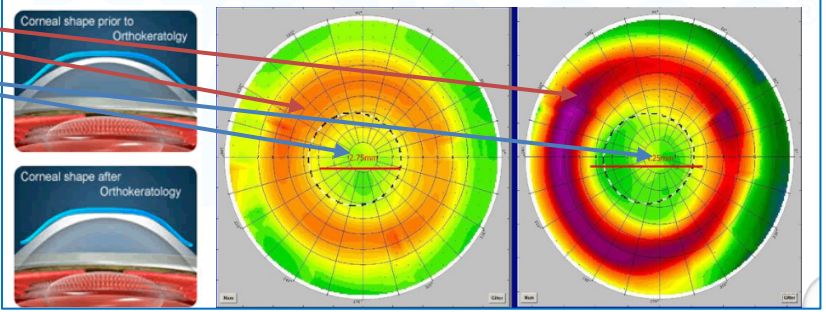
Peripherer Defokus

Die Refraktion in der Peripherie reguliert die Emmetropisierung

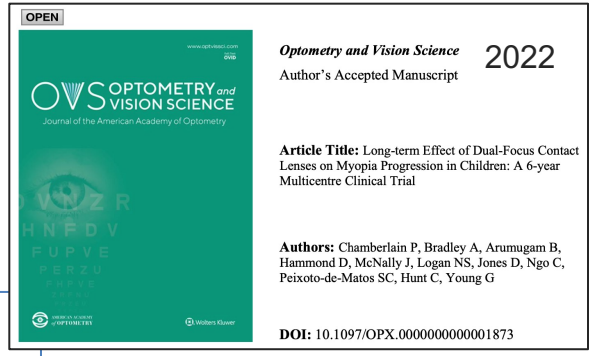


Orthokeratologie

Kontrollierte Verformung der kornealen Topographie zur temporären Korrektur der Ammetropie (z.B. Myopie)



Long Term Effect of Dual-Focus Contact Lenses on Myopia Progression in Children: A 6-year Multicenter Clinical Trial


OPEN

Optometry and Vision Science 2022

Author's Accepted Manuscript

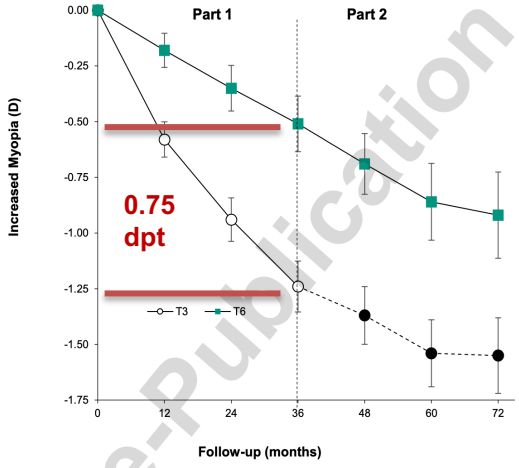
Article Title: Long-term Effect of Dual-Focus Contact Lenses on Myopia Progression in Children: A 6-year Multicentre Clinical Trial

Authors: Chamberlain P, Bradley A, Arumugam B, Hammond D, McNally J, Logan NS, Jones D, Ngo C, Peixoto-de-Matos SC, Hunt C, Young G

DOI: 10.1097/OPX.0000000000001873

Figure 2 MiSight vs Control/MiSight

SER



Control -> MiSight

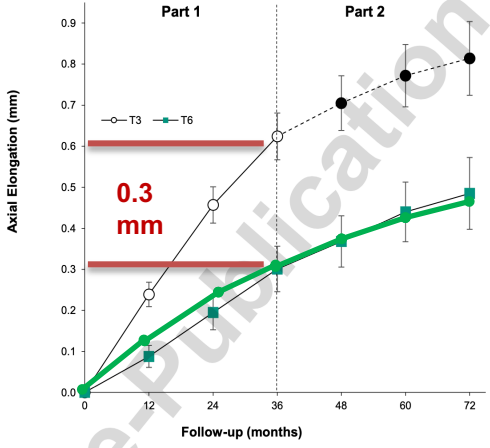
10y 13y 16y

GROSSER **Effekt** KLEINER

Figure 3 MiSight vs Control/MiSight

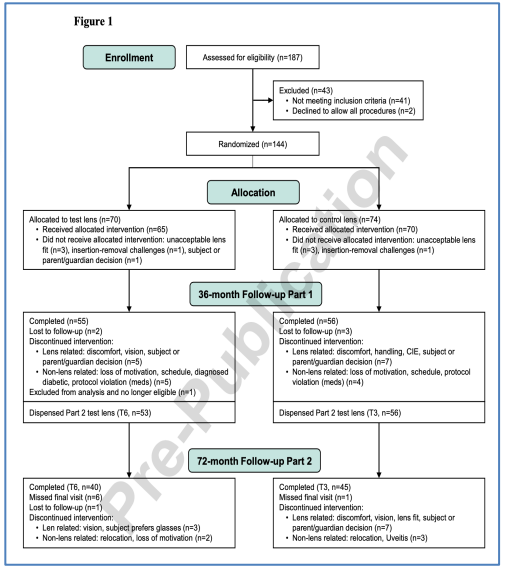
AXL

Control -> MiSight



10y 13y 16y

GROSSER **Effekt** KLEINER



(n=40/45); 54% caucas, 23% asia, 16% mix

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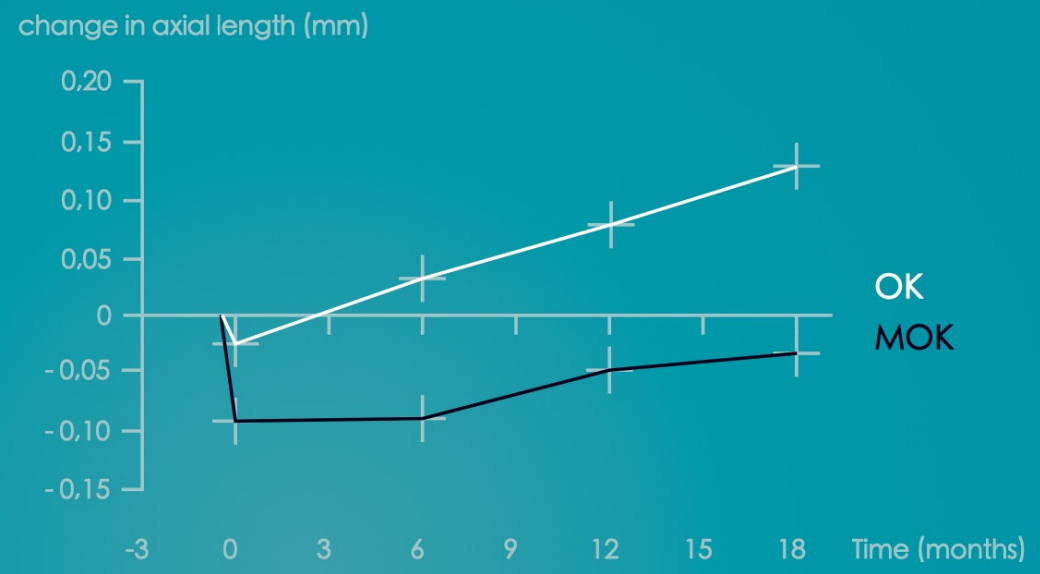
Orthokeratologie

ZUSAMMENFASSUNG DER STUDIE MIT DER FOK MC / FOKX MC VON FALCO LINSEN AG

Grafik: Quelle: The University of Auckland New Zealand; Martin Loertscher, John Phillips, Dep. of Optometry & Vision Sience 2014



Erfolg ist abhängig von der Zonengrösse und der Stärkenverteilung => Dosis Effekt

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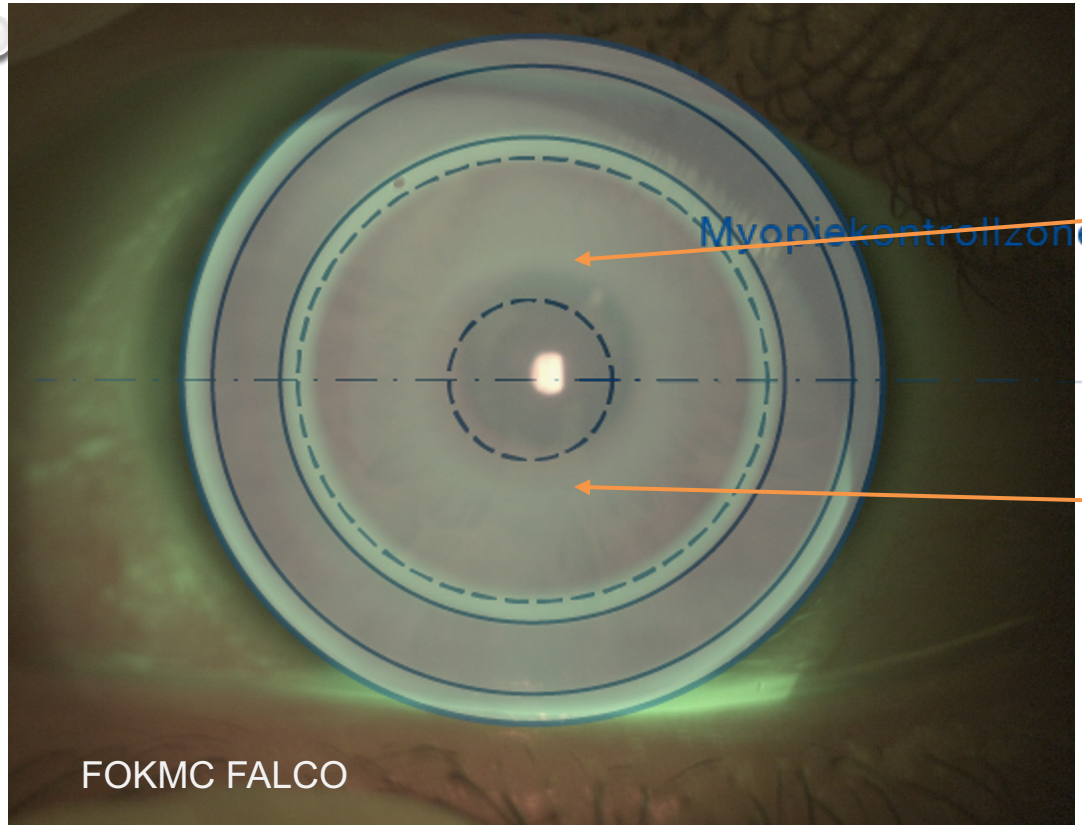
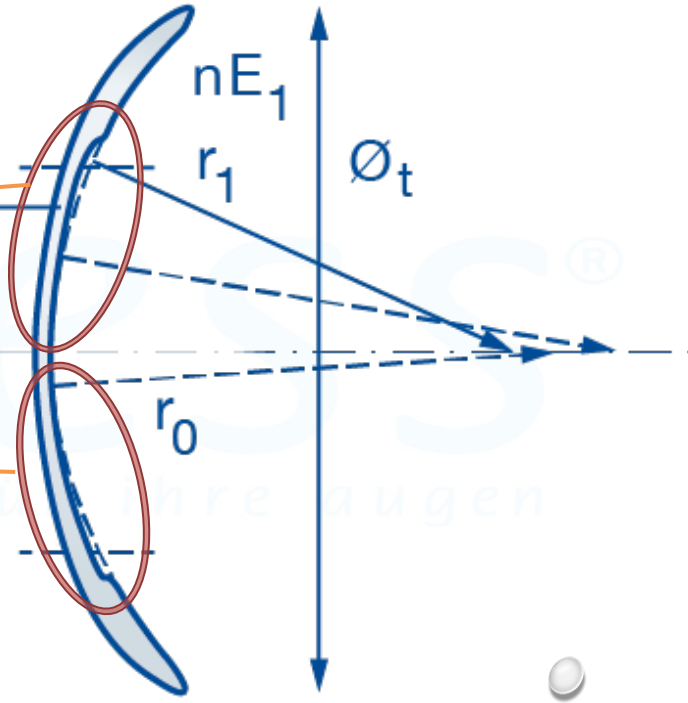
Patientin *ENIA*, geb.2012





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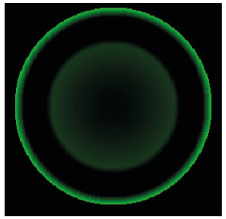
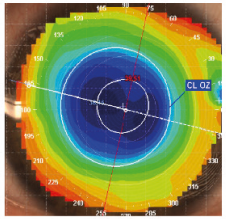
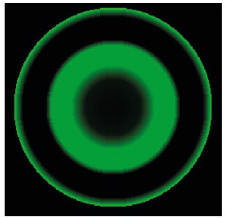
Orthokeratologie

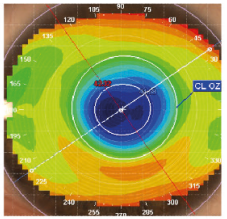




NightFlex

Standart Myopia -1.0 dpt





NightFlex Relax

OZ 5mm HDC Myopia -1.0 dpt

SwissLens

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OPO OPHTHALMIC & PHYSIOLOGICAL OPTICS
THE JOURNAL OF THE COLLEGE OF OPTOMETRISTS
2018
Ophthalmic & Physiological Optics ISSN 0275-5408

Safety and efficacy following 10-years of overnight orthokeratology for myopia control

Takahiro Hiraoka[1], Yasuo Sekine[2], Fumiki Okamoto[1], Toshifumi Mihashi[1] and Tetsuro Oshika[1]

[1]Faculty of Medicine, Department of Ophthalmology, University of Tsukuba, Ibaraki, and [2]Kashiwa Eye Clinic, Chiba, Japan

Citation information: Hiraoka T, Sekine Y, Okamoto F, Mihashi T & Oshika T. Safety and efficacy following 10-years of overnight orthokeratology for myopia control. *Ophthalmic Physiol Opt* 2018; 38: 281–289. https://doi.org/10.1111/opo.12460

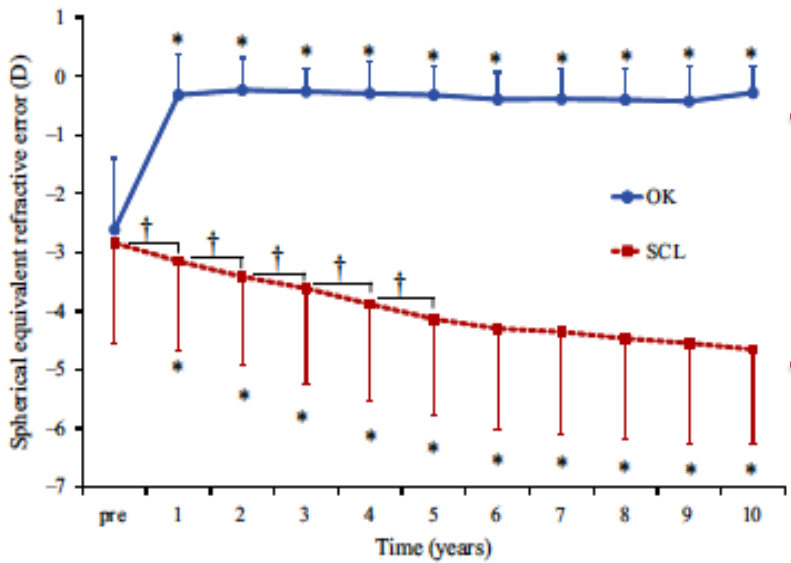

Figure 1. Changes over time in manifest refraction for the OK and SCL groups. OK, orthokeratology; SCL, soft contact lens. *Statistically significant differences compared to the baseline value by the Bonferroni *post-hoc* test. †Statistically significant differences between successive years by the Bonferroni *post-hoc* test.

In conclusion, the present findings showed that OK treatment was effective in slowing myopia progression over a 10-year treatment period and demonstrated a clinically acceptable safety profile among patients between the ages of 8 and 16 years. Patients undergoing OK treatment do not need to wear any vision-correction aids during day-

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Synergistisches Myopie Management: Atropin und Ortho-K

asiatisch, 9 Jahre alt, -2.5 dpt

Contact Lens and Anterior Eye xxx (xxxx) xxx

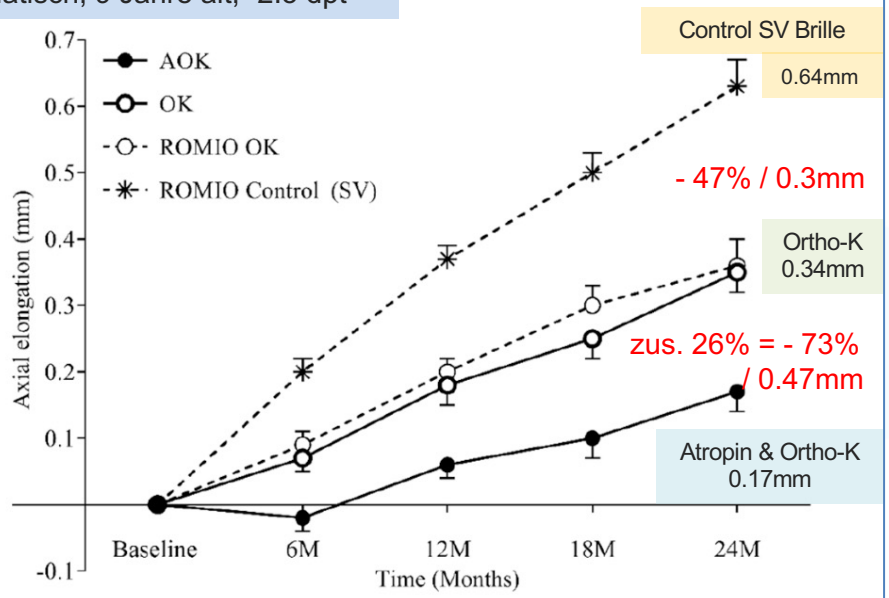

Fig. 2. Cumulative axial elongation over two years in the two groups of subjects in the AOK study compared to subjects in ROMIO study [14].
AOK – Combined atropine with orthokeratology; OK – Orthokeratology alone; ROMIO – Retardation of Myopia in Orthokeratology; SV – Single vision spectacles; Error bars indicate the standard error.

ARTICLE IN PRESS

Contact Lens and Anterior Eye xxx (xxxx) xxx

Contents lists available at ScienceDirect

Contact Lens and Anterior Eye

journal homepage: www.elsevier.com/locate/clae

Combined 0.01% atropine with orthokeratology in childhood myopia control (AOK) study: A 2-year randomized clinical trial

Qi Tan [a,*], Alex LK Ng [b,c], George PM Cheng [d], Victor CP Woo [b,c], Pauline Cho [a]

[a] School of Optometry, The Hong Kong Polytechnic University, Hong Kong, China
[b] Department of Ophthalmology, The University of Hong Kong, Hong Kong, China
[c] Hong Kong Ophthalmic Associates, Hong Kong, China
[d] Hong Kong Laser Eye Centre, Hong Kong, China

2022

Table 4
Summary of symptoms and adverse events reported by subjects received treatment (numbers and percentage) in the two groups.

Symptom	AOK n = 45	OK n = 44	P
Photophobia	6(13%)	0	0.006
Halo	4(9%)	2(5%)	0.677
Blurred vision	4(9%)	6(14%)	0.478
Itching	3(7%)	4(9%)	0.671
Dry eye	2(4%)	2(5%)	0.982
Adverse events			
Infiltrative keratitis	1(2%)	1(2%)	0.987
Corneal erosion	1(2%)	1(2%)	0.987
Conjunctival cyst	1(2%)	0	0.320
Conjunctivitis	3(7%)	3(7%)	0.977
Hordeolum	2(4%)	3(7%)	0.627
≥ Grade 2 staining (Efron's scale)	0	1(2%)	0.309
Chicken Pox	1(2%)	0	0.320
Hospitalization	0	1(2%)*	0.309

AOK – Combined atropine with orthokeratology.
OK – Orthokeratology alone.
P – Probability value of comparison of the percentage of subjects between the two groups, using Crosstab analyses.
*Hospitalization due to broken leg for two months.

Zusätzlicher Effekt + 26%

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Synergistisches Myopie Management: Atropin und weiche bifokale KL

Optometry and Vision Science 2022

Author's Accepted Manuscript

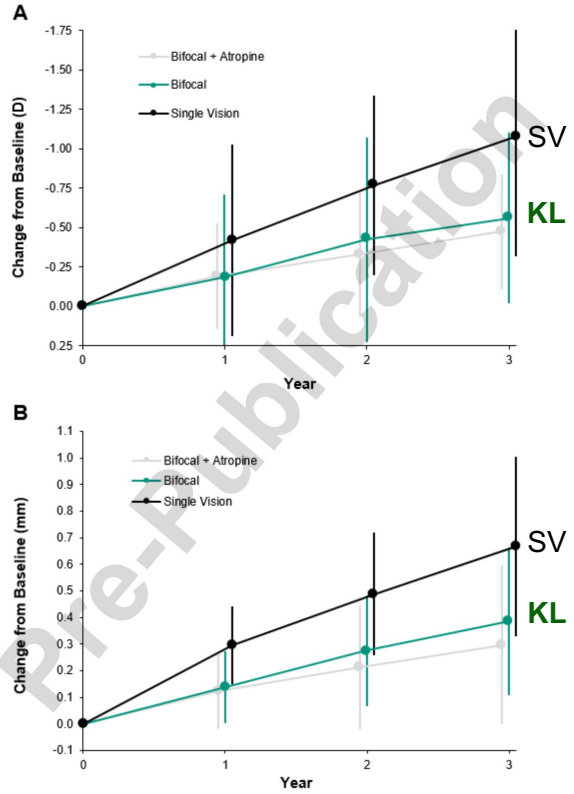
Article Title: Effect of Combining 0.01% Atropine with Soft Multifocal Contact Lenses on Myopia Progression in Children

Authors: Huang Jones J, Mutti DO, Jones-Jordan LA, Walline JJ

DOI: 10.1097/OPX.0000000000001884

Figure 1

kaukasisch, 10 Jahre alt, -2.3 dpt



Zusätzlicher Effekt

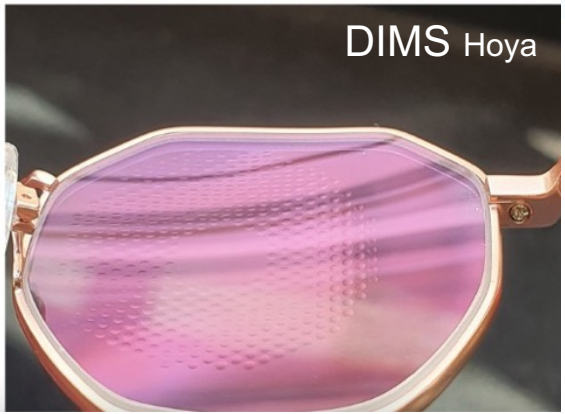
ca. 21% bei AXL

ca. 5% bei SER

DISCUSSION

In this 3-year non-randomized clinical study, the results indicate that combining 0.01% atropine with soft multifocal contact lens wear failed to demonstrate slower myopia progression or eye growth than using multifocal lenses alone, but both the combination treatment and soft multifocal contact lens treatment slowed myopia progression and eye growth significantly more than single vision contact lenses.

Myopie Management
mit Brillengläser



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Clinical science

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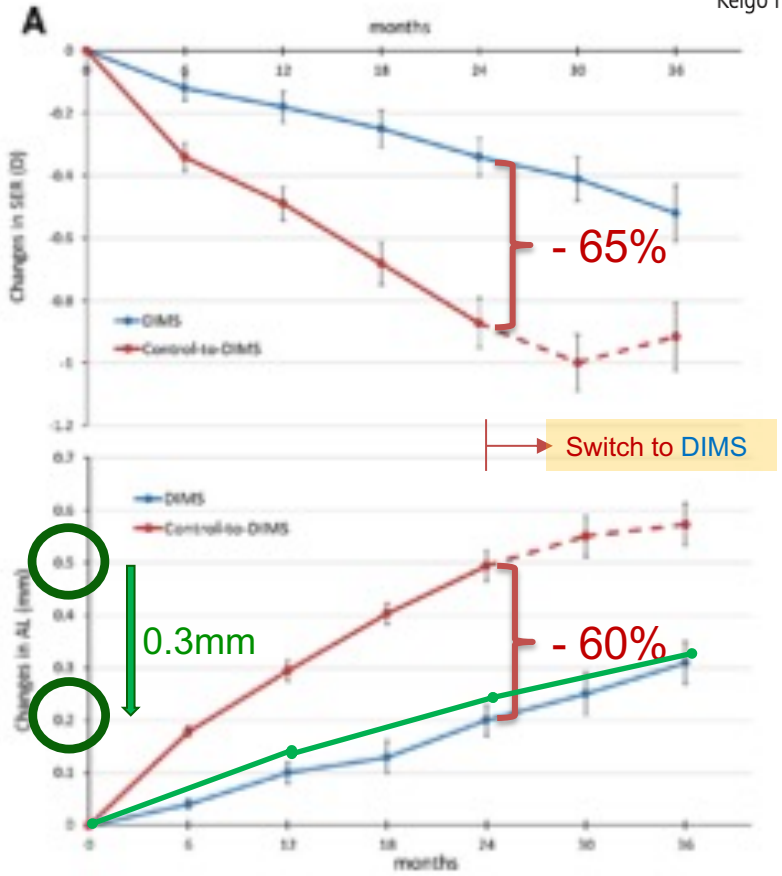
Myopia control effect of defocus incorporated multiple segments (DIMS) spectacle lens in Chinese children: results of a 3-year follow-up study

Carly SY Lam [1,2] Wing Chun Tang,[1] Paul H Lee [3] Han Yu Zhang [1] Hua Qi,[4] Keigo Hasegawa,[4] Chi Ho To[1,2]



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ARVO Annual Meeting Abstract | June 2022

Myopia control in children wearing DIMS spectacle lens: 6 years results

Carly SY Lam; Wing Chun Tang; Han Yu Zhang; Dennis Yan-yin Tse; Chi-ho To

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JAMA Ophthalmology | Original Investigation 2022

Spectacle Lenses With Aspherical Lenslets for Myopia Control vs Single-Vision Spectacle Lenses

A Randomized Clinical Trial

Jinhua Bao, PhD; Yingying Huang, MD; Xue Li, PhD; Adeline Yang, MSc; Fangchao Zhou, BSc; Junqian Wu, BSc; Chu Wang, BSc; Yuhao Li, BSc; Ee Woon Lim, BSc; Daniel P. Spiegel, PhD; Björn Drobe, PhD; Hao Chen, MD, OD

IMPORTANCE Reducing myopia progression can reduce the risk of associated ocular pathologies.

OBJECTIVE To evaluate whether spectacle lenses with higher lenslet asphericity have a higher myopia control efficacy throughout 2 years.

DESIGN, SETTING, AND PARTICIPANTS This double-masked randomized clinical trial was conducted between July 2018 and October 2020 at the Eye Hospital of Wenzhou Medical University in Wenzhou, China. Children aged 8 to 13 years with a cycloplegic spherical equivalent refraction (SER) of −0.75 D to −4.75 D and astigmatism with less than −1.50 D were recruited. A data and safety monitoring committee reviewed findings from a planned interim analysis in 2019.

INTERVENTIONS Participants were randomly assigned in a 1:1:1 ratio to receive spectacle lenses with highly aspherical lenslets (HAL), spectacle lenses with slightly aspherical lenslets (SAL), or single-vision spectacle lenses (SVL).

MAIN OUTCOME AND MEASURES Two-year changes in SER and axial length and their differences between groups.

RESULTS Of 157 participants who completed each visit (mean [SD] age, 10.4 [1.2] years), 54 were analyzed in the HAL group, 53 in the SAL group, and 50 in the SVL group. Mean (SE) 2-year myopia progression in the SVL group was 1.46 (0.09) D. Compared with SVL, the mean (SE) change in SER was less for HAL (by 0.80 [0.11] D) and SAL (by 0.42 [0.11] D; $P \leq .001$). The mean (SE) increase in axial length was 0.69 (0.04) mm for SVL. Compared with SVL, increase in axial length was slowed by a mean (SE) of 0.35 (0.05) mm for HAL and 0.18 (0.05) mm for SAL ($P \leq .001$). Compared with SVL, for children who wore HAL at least 12 hours every day, the mean (SE) change in SER was slowed by 0.99 (0.12) D, and increase in axial length slowed by 0.41 (0.05) mm.

CONCLUSIONS AND RELEVANCE In this study, HAL and SAL reduced the rate of myopia progression and axial elongation throughout 2 years, with higher efficacy for HAL. Longer wearing hours resulted in better myopia control efficacy for HAL.

TRIAL REGISTRATION Chinese Clinical Trial Registry Identifier: ChiCTR1800017683

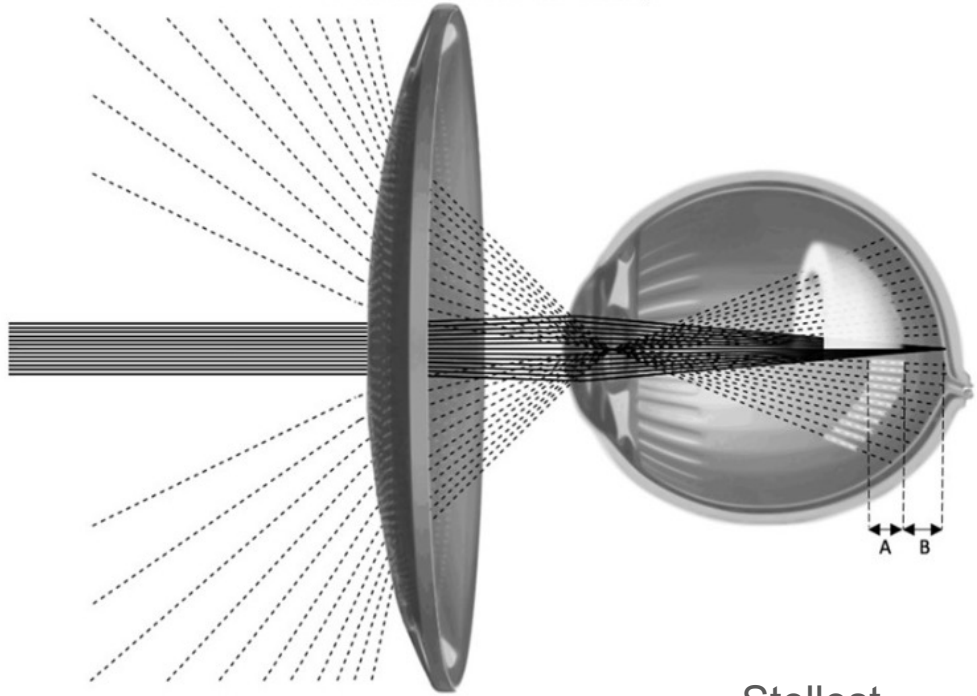
Visual Abstract
Invited Commentary
Supplemental content

Author Affiliations: Eye Hospital and School of Ophthalmology and Optometry, Wenzhou Medical University, Wenzhou, Zhejiang, China (Bao, Huang, X. Li, Zhou, Wu, Wang, Y. Li, Chen); National Clinical Research Center for Ocular Diseases, Wenzhou, Zhejiang, China (Bao, Huang, X. Li, Chen); Wenzhou Medical University-Essilor International Research Center (WEIRC), Wenzhou Medical University, Wenzhou, Zhejiang, China (Bao, Huang, X. Li, Yang, Lim, Spiegel, Drobe); R&D AMERA, Essilor International, Singapore, Singapore (Yang, Lim, Spiegel, Drobe).

Corresponding Author: Hao Chen, MD, OD, Eye Hospital and School of Ophthalmology and Optometry, Wenzhou Medical University, 270 Xueyuan Rd, Wenzhou 325027, China (chenhao@mail.eye.ac.cn).

JAMA Ophthalmol. doi:10.1001/jamaophthalmol.2022.0401
Published online March 31, 2022.

Illustration of the study device providing a volume of myopic defocus (VoMD) (white sh front of the retina through 11 concentric rings of contiguous lenslets (A=depth of VoMD B=distance from the retina).



Jinhua Bao et al. Br J Ophthalmol
doi:10.1136/bjophthalmol-2020-318367

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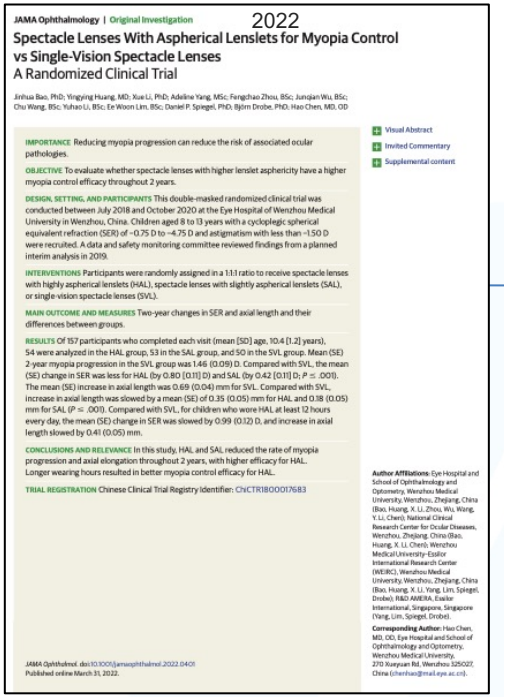
Dosis = Wirkung



JAMA Ophthalmology | Original Investigation 2022

Spectacle Lenses With Aspherical Lenslets for Myopia Control vs Single-Vision Spectacle Lenses
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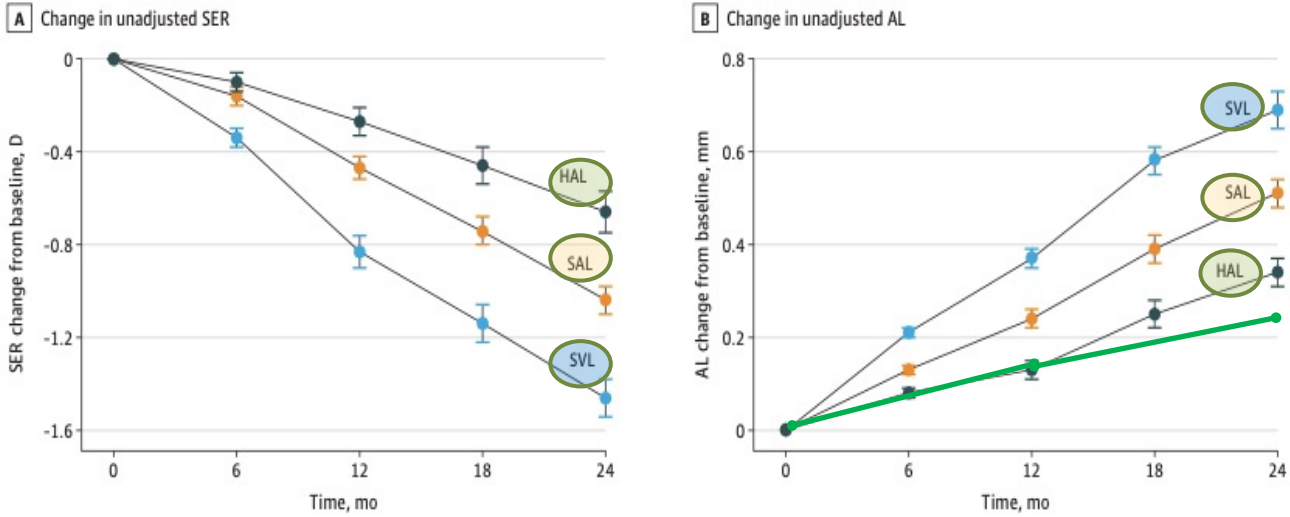
JAMA Ophthalmol. doi:10.1001/jamaophthalmol.2022.0401
Published online March 31, 2022.

Figure 2. Change in Unadjusted Spherical Equivalent Refraction (SER) and Axial Length (AL) From Baseline to 2 Years



Error bars represent standard errors of the mean. HAL indicates spectacle lenses with highly aspherical lenslets; SAL, spectacle lenses with slightly aspherical lenslets; SVL, single-vision spectacle lenses.

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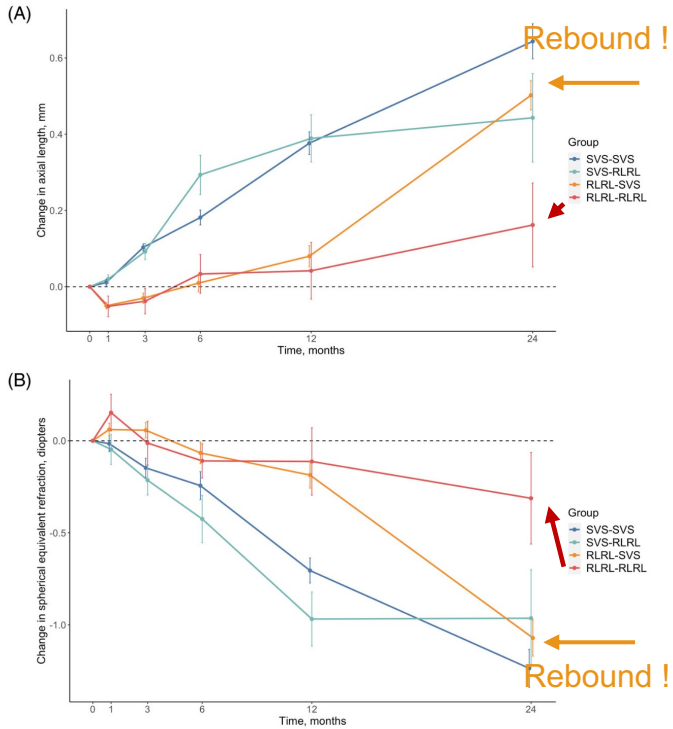
Low-Level-Red-Light

Clin&Exp Ophthalmology 2022

FIGURE 2 Mean changes in axial length and cycloplegic spherical equivalent refractions from baseline to 24 months. (A) For axial elongation; (B) for myopia progression. RLRL, repeated low-level red-light; SVS, single vision spectacle

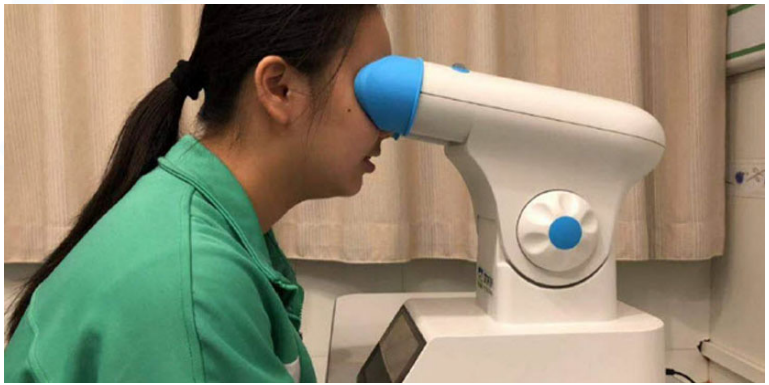


Received: 24 May 2022 | Revised: 18 August 2022 | Accepted: 21 August 2022
DOI: 10.1111/ceo.14149

ORIGINAL ARTICLE - CLINICAL SCIENCE Clinical & Experimental Ophthalmology WILEY

Sustained and rebound effect of repeated low-level red-light therapy on myopia control: A 2-year post-trial follow-up study

Ruilin Xiong MD[1] | Zhuoting Zhu MD, PhD[1,2,3] | Yu Jiang MD, PhD[1] | Xiangbin Kong MD, PhD[4] | Jian Zhang MD[1] | Wei Wang MD, PhD[1] | Katerina Kiburg MPH, PhD[2] | Yixiong Yuan MD[1] | Yanping Chen MD[1] | Shiran Zhang MD[1] | Meng Xuan MD[1] | Junwen Zeng MD, PhD[1] | Ian G. Morgan PhD[5] | Mingguang He MD, PhD[1,2,3]



2 x 3min für 5 Tage pro Woche. Sehr hell, oft Nachbilder.

Aktuell kontroverse Diskussion. Synergie mit anderen Methoden ?

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Risiko Beurteilung "Anna"

	Low Risk	Increased Risk	High Risk
Myopia	< -2.0 dpt	-2.25 to -4.0 dpt	> -4.0 dpt
Progression/Year	-0.25 dpt	-0.5 dpt	>-0.5 dpt
Parental Myopia	none	1 parent	[illegible]
Age	> 14 years	9 - 14 years	[illegible]
Near work/Day	1 - 2 h	[illegible]	> 4 h
Near distance	> 30 cm	[illegible] cm	< 20 - 25 cm
Outdoor time	[illegible]	1 - < 2 h	< 1 h
Heredity	[illegible] South-American	Caucasian	Asian
Axial lenght male	< 23 - 23.5 mm	23.5 - 24.5 mm	> 24.5 mm
female	< 22.5 - 23 mm	23 - 24 mm	> 24 mm

⇒ TO BE CONTINUED !

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