

Evidenzbasierte Kommunikation und Produktauswahl im Myopie-Management

GEORG SCHEUERER

MSC VISION SCIENCE AND BUSINESS (OPTOMETRY)



Erklärung zu Interessenkonflikten

Ich habe keine finanziellen Interessen im Zusammenhang mit dem Vortrag.

Nachweisstufen





Korrelation vs. Kausalität

Observational Study

> [Ophthalmology](#). 2021 Jun;128(6):837-847.

doi: 10.1016/j.opthta.2021.02.007. Epub 2021 Feb 8.

Alcohol Consumption and Incident Cataract Surgery in Two Large UK Cohorts

Sharon Y L Chua ¹, Robert N Luben ², Shabina Hayat ², David C Broadway ³, Kay-Tee Khaw ², Alasdair Warwick ⁴, Abigail Britten ⁵, Alexander C Day ⁶, Nicholas Strouthidis ⁶, Praveen J Patel ⁶, Peng T Khaw ⁶, Paul J Foster ⁶, Anthony P Khawaja ⁷;
UK Biobank Eye and Vision Consortium

Affiliations + expand

PMID: 33571551 PMCID: [PMC8162662](#) DOI: [10.1016/j.opthta.2021.02.007](#)

[Free PMC article](#)

Regression zur Mitte

Korrelation vs. Kausalität



Quelle: <https://www.bild.de/bild-plus/sport/mehr-sport/sport-mix/jan-ullrich-warum-er-auf-dieser-bild-schlagzeile-rumtrampelte-74586230.bild.html>



Abstract

Purpose: Low-concentration atropine is an emerging therapy for myopia progression, but its efficacy and optimal concentration remain uncertain. Our study aimed to evaluate the efficacy and safety of low-concentration atropine eye drops at 0.05%, 0.025%, and 0.01% compared with placebo over a 1-year period.

Design: Randomized, placebo-controlled, double-masked trial

Participants: A total of 438 children aged 4 to 12 years with myopia of at least -1.0 diopter (D) and astigmatism of ≥ 0.5 D or less.

Methods: Participants were randomly assigned in a 1:1:1:1 ratio to receive 0.05%, 0.025%, and 0.01% atropine eye drops, or placebo eye drop, respectively, once nightly to both eyes for 1 year. Cycloplegic refraction, axial length (AL), accommodation amplitude, pupil diameter, and best-corrected visual acuity were measured at baseline, 2 weeks, 4 months, 8 months, and 12 months. Visual Function Questionnaire was administered at the 1-year visit.

Main outcome measures: Changes in spherical equivalent (SE) and AL were measured, and their differences among groups were compared using generalized estimating equation.

Results: After 1 year, the mean SE change was -0.27 ± 0.61 D, -0.46 ± 0.45 D, -0.59 ± 0.61 D, and -0.81 ± 0.53 D in the 0.05%, 0.025%, and 0.01% atropine groups, and placebo groups, respectively ($P < 0.001$), with a respective mean increase in AL of 0.20 ± 0.25 mm, 0.29 ± 0.20 mm, 0.36 ± 0.29 mm, and 0.41 ± 0.22 mm ($P < 0.001$). The accommodation amplitude was reduced by 1.58 ± 2.82 D, 1.81 ± 2.81 D, 0.28 ± 3.64 D, and 0.32 ± 2.01 D, respectively ($P < 0.001$). The pupil sizes under photopic and mesopic conditions were increased respectively by 1.04 ± 1.02 mm and 0.69 ± 0.83 mm in the 0.05% atropine group, 0.76 ± 0.80 mm and 0.43 ± 0.81 mm in the 0.025% atropine group, 0.43 ± 0.80 mm and 0.23 ± 0.48 mm in the 0.01% atropine group, and 0.13 ± 1.07 mm and 0.02 ± 0.66 mm in the placebo group ($P < 0.001$). Visual acuity and vision-related quality of life were not affected in each group.

Conclusions: The 0.05%, 0.025%, and 0.01% atropine eye drops reduced myopia progression along a concentration-dependent response. All concentrations were well tolerated without an adverse effect on vision-related quality of life. Of the 3 concentrations used, 0.05% atropine was most effective in controlling SE progression and AL elongation over a period of 1 year.

Copyright © 2019 American Academy of Ophthalmology. Published by Elsevier Inc. All rights reserved.

Yam JC et.al. Low-Concentration Atropine for Myopia Progression (LAMP):
A **Randomized, Double-Blinded, Placebo-Controlled** Trial of 0,05%, 0,025%, and 0,01%
Atropine Eye Drops in Myopia Control . *Ophthalmology*. 2019;126(1):113-124.

After 1 year, the mean SE change was -0.27 ± 0.61 D, -0.46 ± 0.45 D, -0.59 ± 0.61 D, and -0.81 ± 0.53 D in the 0.05%, 0.025%, and 0.01% atropine groups, and placebo groups, respectively ($P < 0.001$), with a respective mean increase in AL of 0.20 ± 0.25 mm, 0.29 ± 0.20 mm, 0.36 ± 0.29 mm, and 0.41 ± 0.22 mm (**$P < 0.001$**)

P-Wert



Bedingte Wahrscheinlichkeit
das das Ergebnis zufällig auftreten kann

Bsp.

P-Wert: 0,50 - 50% „Ratewahrscheinlichkeit“

P-Wert: 0,05 - 5% „Ratewahrscheinlichkeit“

Glaubwürdigkeit der Nullhypothese
Durch Zufall -> gleichgut oder besser

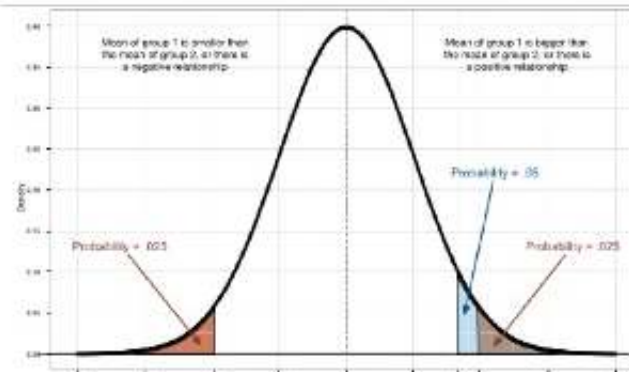
P-Wert

One-and two-tailed tests

- Test for directional hypothesis: one-tailed test
- Test for non-directional hypothesis: two-tailed test

Be aware:

- With one-tailed test we reject the hypothesis with no effect and with effect in opposite direction!
- With two-tailed test probability has to be split in half for each side, so for each side area of significant values is smaller



$$z = \frac{X - \bar{X}}{s}$$

$$p_{\text{blue}} = 0.05$$
$$z_{\text{blue}} = 1.65$$

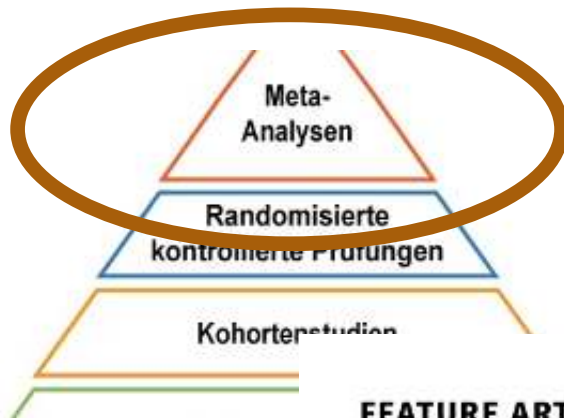
$$p_{\text{red}} = 0.025$$
$$z_{\text{red}} = 1.96$$

1/19/20

Katja Schiborr

49

Mit freundlicher Genehmigung: Katja Schiborr M.Sc. Vision Science and Business (Optometry)



FEATURE ARTICLE ON LINE

Orthokeratology for Myopia Control

A Meta-analysis

Si, Jun-Kang^{*}; Tang, Kai^{*}; Bi, Hong-Sheng^{*}; Guo, Da-Dong[†]; Guo, Jun-Guo^{*}; Wang, Xing-Rong^{*}

[Author Information](#) ☺

Optometry and Vision Science 92(3):p 252-257, March 2015. | DOI:
10.1097/OPX.0000000000000505

FREE

Press Release

 Metrics

Links – wissenschaftliche Datenbanken

www.pubmed.com

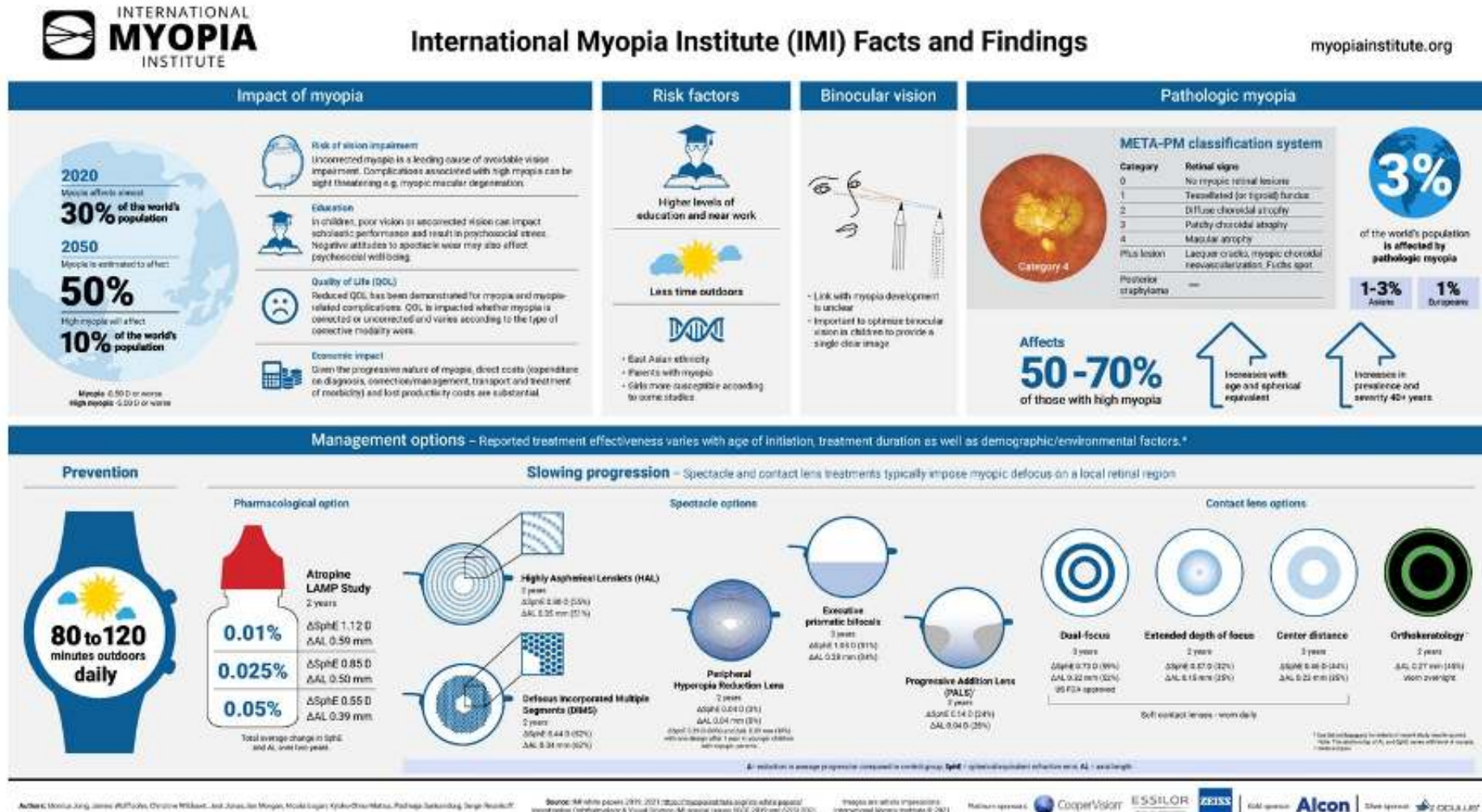
<https://pubmed.ncbi.nlm.nih.gov>

<https://scholar.google.de>

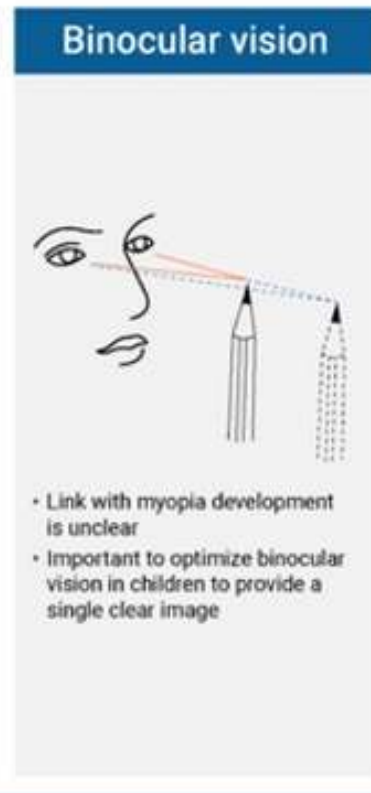
Sonstige Internet-Suchmaschinen



Arbeitsgruppen



Binokularsehen



Naheso
Hoher “Lag of Accomodation“
Exotropie

.....

Accommodative lag before and after the onset of myopia

Donald O Mutti¹, G Lynn Mitchell, John R Hayes, Lisa A Jones, Melvin L Moeschberger, Susan A Cotter, Robert N Kleinstein, Ruth E Manny, J Daniel Twelker, Karla Zadnik, CLEERE Study Group

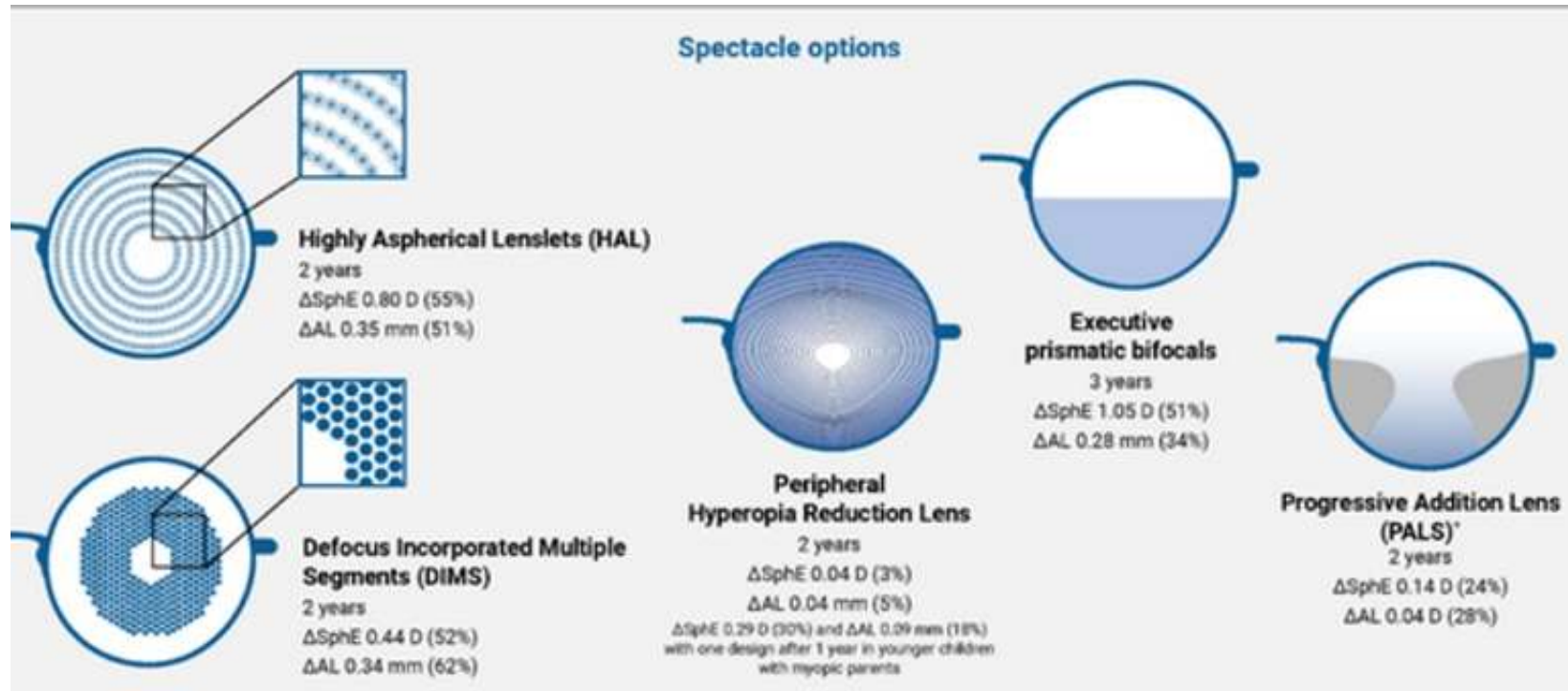
Accommodative Lag and Juvenile-Onset Myopia Progression in Children Wearing Refractive Correction

David A. Berntsen,¹ Loraine T. Sinnott,² Donald O. Mutti,² Karla Zadnik,² and The CLEERE Study Group³

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

Studien zu finden: IMI White Paper: <http://myopiainstitute.org/>
Tipp: im PDF, Suchfunktion ctrl+f (windows) und cmd+f (IOS)



Nicht enthalten: Perifocal -> nach eigener Berechnung 40%* Verlangsamung nach 3 Jahren

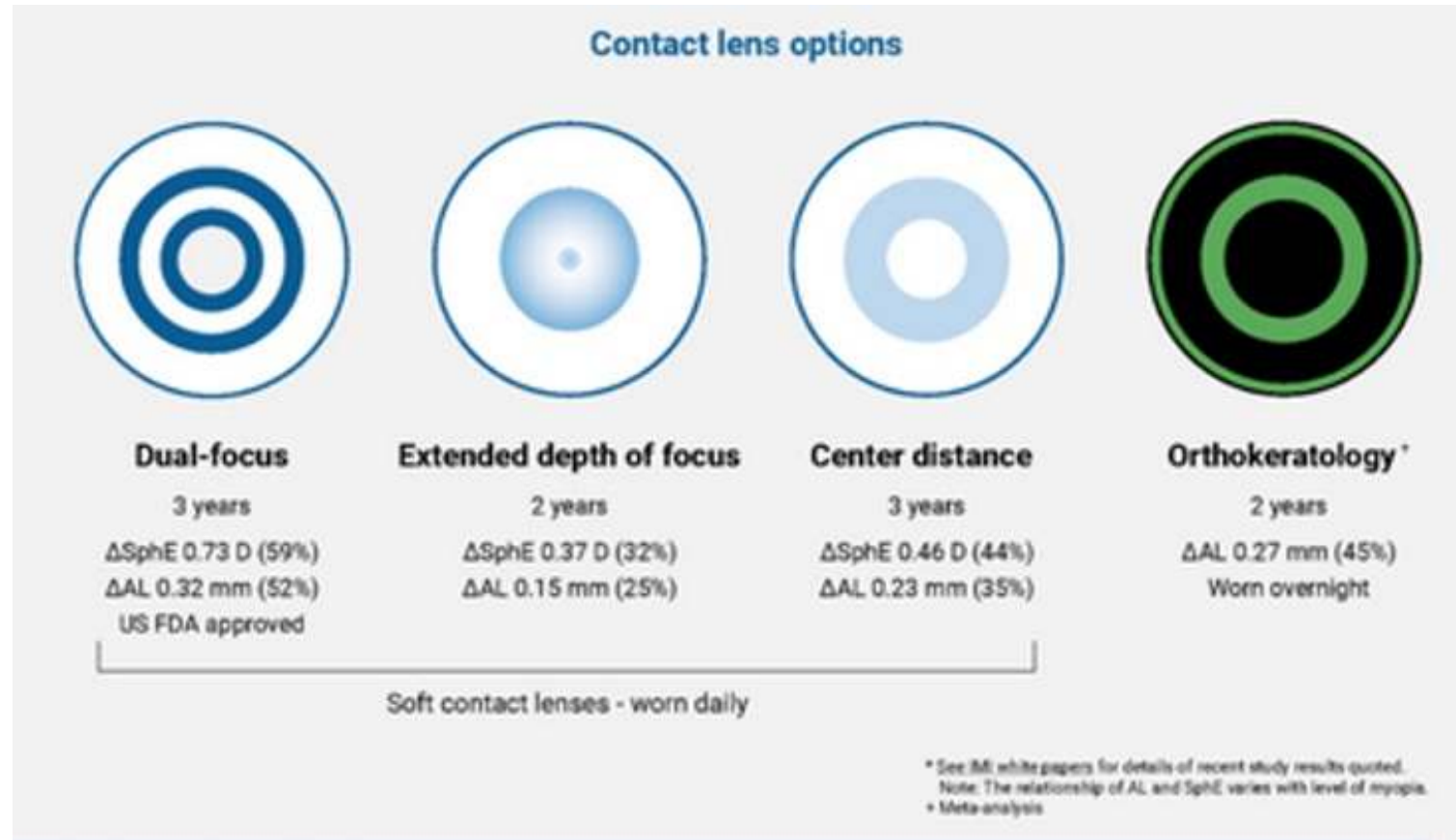
*Aus den Zahlen: [Long-term results of perifocal defocus spectacle lens correction in children with progressive myopia](#) © E.P. TARUTTA, O.V. PROSKURINA, N.A. TARASOVA, S.V. MILASH, G.A. MARKOSYAN
Helmholtz National Medical Research Center of Eye Diseases, 14/19 Sadovaya-Chernogryazskaya St.,
Moscow, Russian Federation, 2019

Interventionsmöglichkeiten BG

- Miyosmart (Hoya) Δ SphE 52% AL 62%
- Stellest (Essilor) Δ SphE 55% AL 51%
- Exekutivbifokal bei Naheso **oder** BI Prismen Δ SphE 51% AL 34%
(nicht maskierte Studie)
- Perifocal (in D:Frame Tec) Δ SphE 40% (eig. Berechnung) AL ??
(Qualität der Studie?)
- Gleitsicht bei Naheso Δ SphE 24% AL 28%
- Sonstige: zB Freiform Bifo (zB Visall) - keine Studien!

Δ SphE und AL -> PROZENTANGABE sind **Verlangsamung**

Interventionsmöglichkeiten KI



Ortho-K erst ab ca. -3,00 dpt den vollen Effekt um die Progression abzuschwächen

Ortho - K

Myopia control studies using ortho-K lenses.

Author (year)	Location	Number of participants (OK/control)	Study design	Study duration (years)	Control group	Reduction effect (%)
Cho et al. ²⁴⁴	Hong Kong	35/35	Self-selected prospective, early study control	2	SV	46
Walline et al. (2009) ²⁴⁵	USA	28/28	Prospective and historical control	2	SVCL	56
Kakita et al. ²⁴⁶	Japan	42/50	Self-selected retrospective	2	SV	36
Cho and Cheung ²⁴⁷	Hong Kong	37/41	Randomized single-masked	2	SV	43
Hiraoka et al. ²⁴⁸	Japan	22/21	Self-selected retrospective	5	SV	30
Santodomingo-Rubido et al. ²⁴⁹	Spain	31/30	Self-selected prospective	2	SV	32

SV: single vision spectacle lens; SVCL: single vision contact lens; CLE: contralateral eye.

Eur J Ophthalmol. 2021 May;31(5):873-880

Published online 2021 Mar 6. doi: [10.1177/11206720211005050](https://doi.org/10.1177/11206720211005050)

PRACU: P20200918

PMID: [33673746](https://pubmed.ncbi.nlm.nih.gov/33673746/)

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

Jones HM^{1,2}, Borchers J^{3,4}, Nishida K^{5,6}, Phipps KP^{7,8}, Jolliffe JA⁹

Jain A¹⁰, Hsu H¹¹, Chhabra R¹², Ingvar A¹³, Moshirfar A¹⁴, Andrews D¹⁵, Zhan Z¹⁶, Hsu J¹⁷, Chen P¹⁸

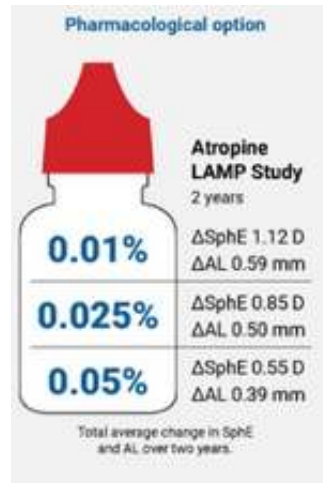
Jewett A¹⁹, Garganese J²⁰, Jelliffe M²¹, Hsu J²², Hsu J²³, Hsu J²⁴, Hsu J²⁵, Hsu J²⁶, Hsu J²⁷

Lyle S²⁸, Gray T²⁹, Jan R³⁰, Fong A³¹, Fong A³², Fong A³³, Fong A³⁴, Fong A³⁵, Fong A³⁶

Ebuchi M³⁷, Akiyama A³⁸, Akiyama A³⁹, Akiyama A⁴⁰, Akiyama A⁴¹, Akiyama A⁴²

Single (continued)

Interventionsmöglichkeiten Atropin



→ Verlangsamung zwischen 30% und 80%

→ Nebenwirkung?

→ Rebound?

reichen 0,01%? -> eher NEIN. Augenfarbe abhängige Effektivität?

Comment > JAMA Ophthalmol. 2018 Mar 1;136(3):303.

doi: 10.1001/jamaophthalmol.2017.6638.

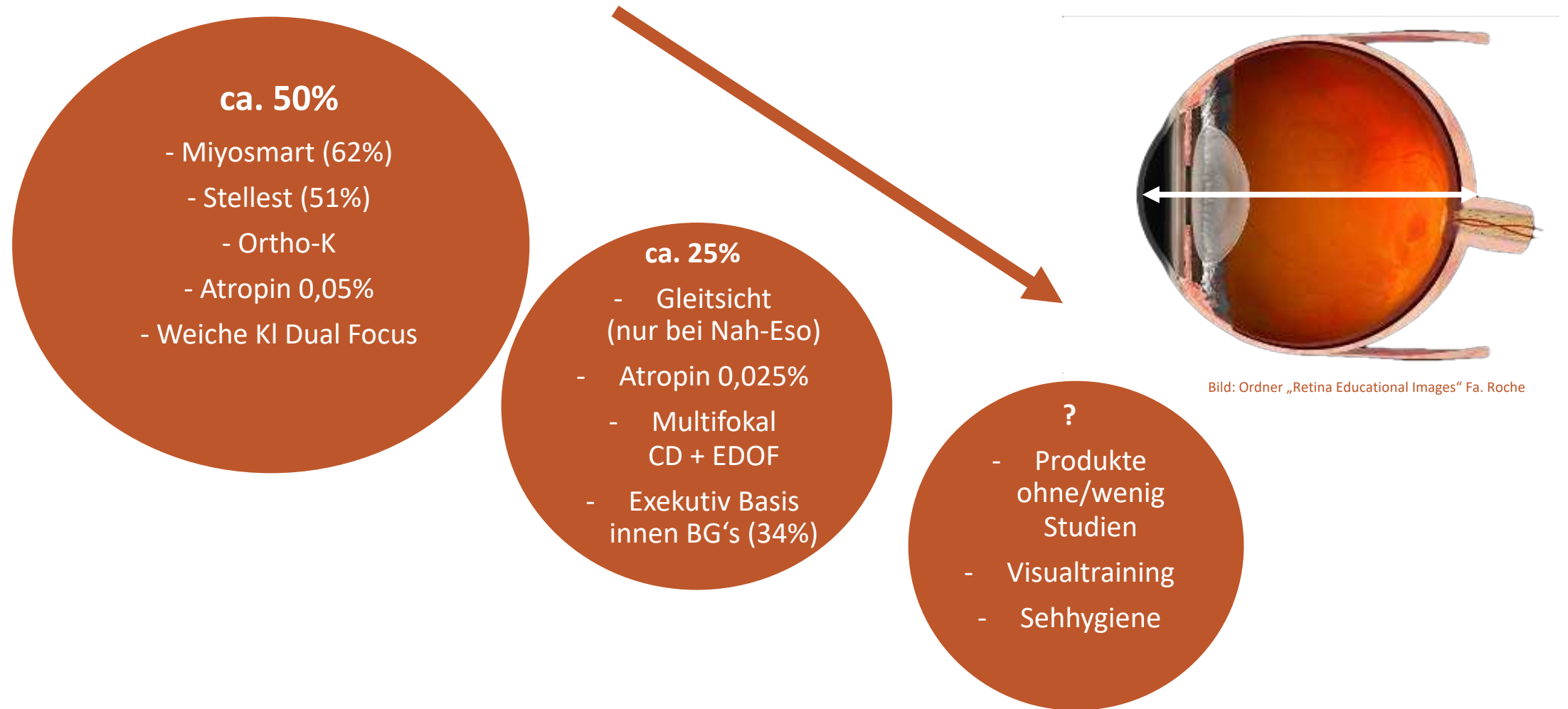
Low-Dose Atropine for Myopia Control: Considering All the Data

Mark A Bullimore ¹, David A Berntsen ¹

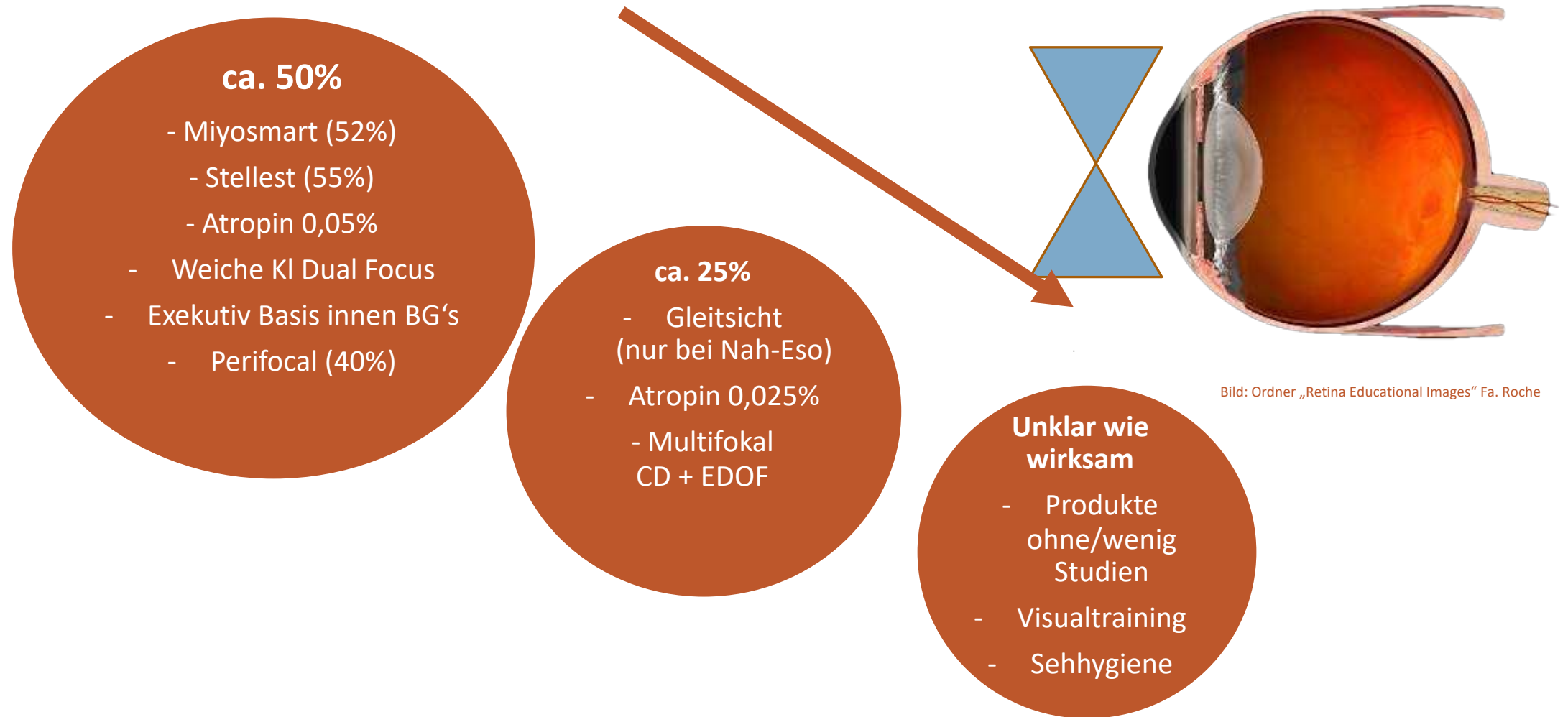
Affiliations + expand

PMID: 29423500 DOI: 10.1001/jamaophthalmol.2017.6638

Prozentuale Verlangsamung bezogen auf die Achslänge



Prozentuale Verlangsamung bezogen auf die Refraktion



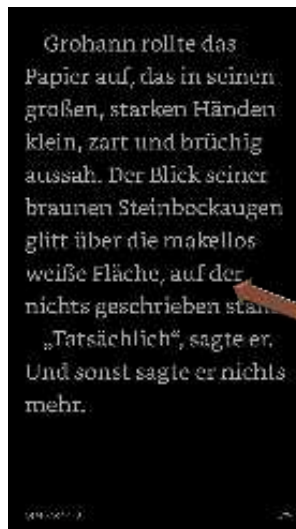
Sehhygiene (im Myopiemanagement)

Verlangsamung der Kurzsichtigkeit

Um die Entwicklung der Kurzsichtigkeit zu verlangsamen, gibt es verschiedene Methoden, die dabei helfen.

Was Sie und Ihr Kind tun können:

- Das Kind sollte pro Tag mindestens 90 Minuten bei Tageslicht im Freien verbringen.
- Wenden Sie die 20-20-20-Regel an: Fokussieren Sie sich alle 20 Minuten für 20 Sekunden auf ein Objekt, das 20 Fuß (entspricht etwa 6 Meter) entfernt ist.
- Bei Nahtätigkeiten sollte immer eine Ellenlänge zum Buch, Handy oder Computer eingehalten werden.
- Beim Lesen am Handy/Tablet: Schwarzen Hintergrund mit weißer Schrift verwenden



Random Controlled Trials vs. Real World

> Oman J Ophthalmol. 2009 May;2(2):67-72. doi: 10.4103/0974-620X.53035.

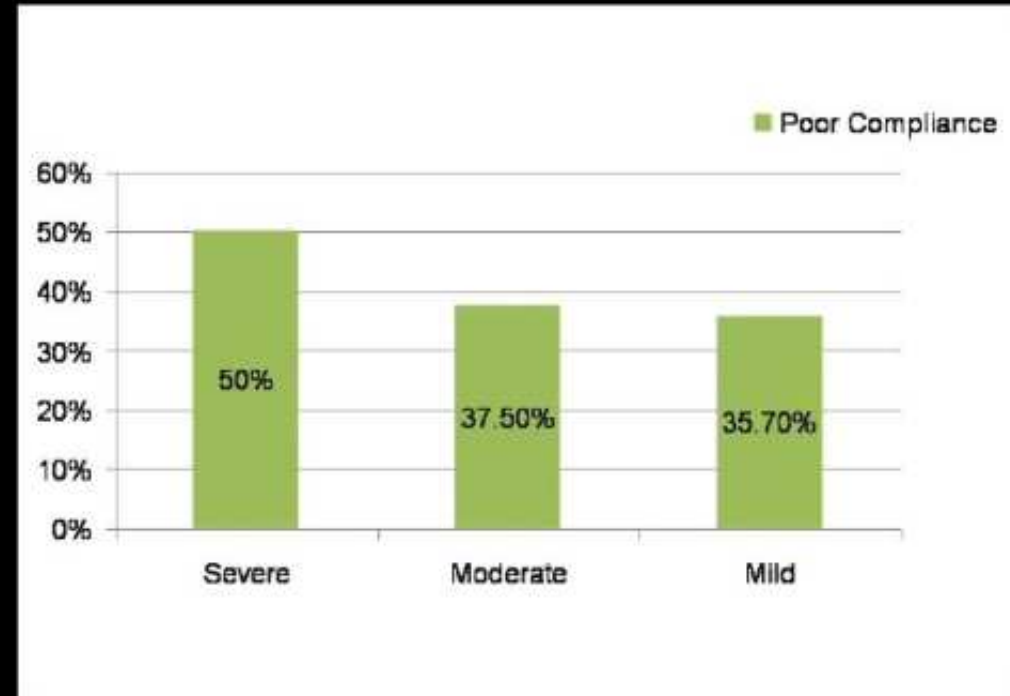
Compliance of amblyopic patients with occlusion therapy: A pilot study

Sana Al-Zuhaibi ¹, Iman Al-Harhi, Pascale Coymans, Aisha Al-Busaidi, Yahya Al-Farsi, Anuradha Ganesh

Affiliations + expand

PMID: 20671832 PMCID: PMC2905182 DOI: 10.4103/0974-620X.53035

[Free PMC article](#)

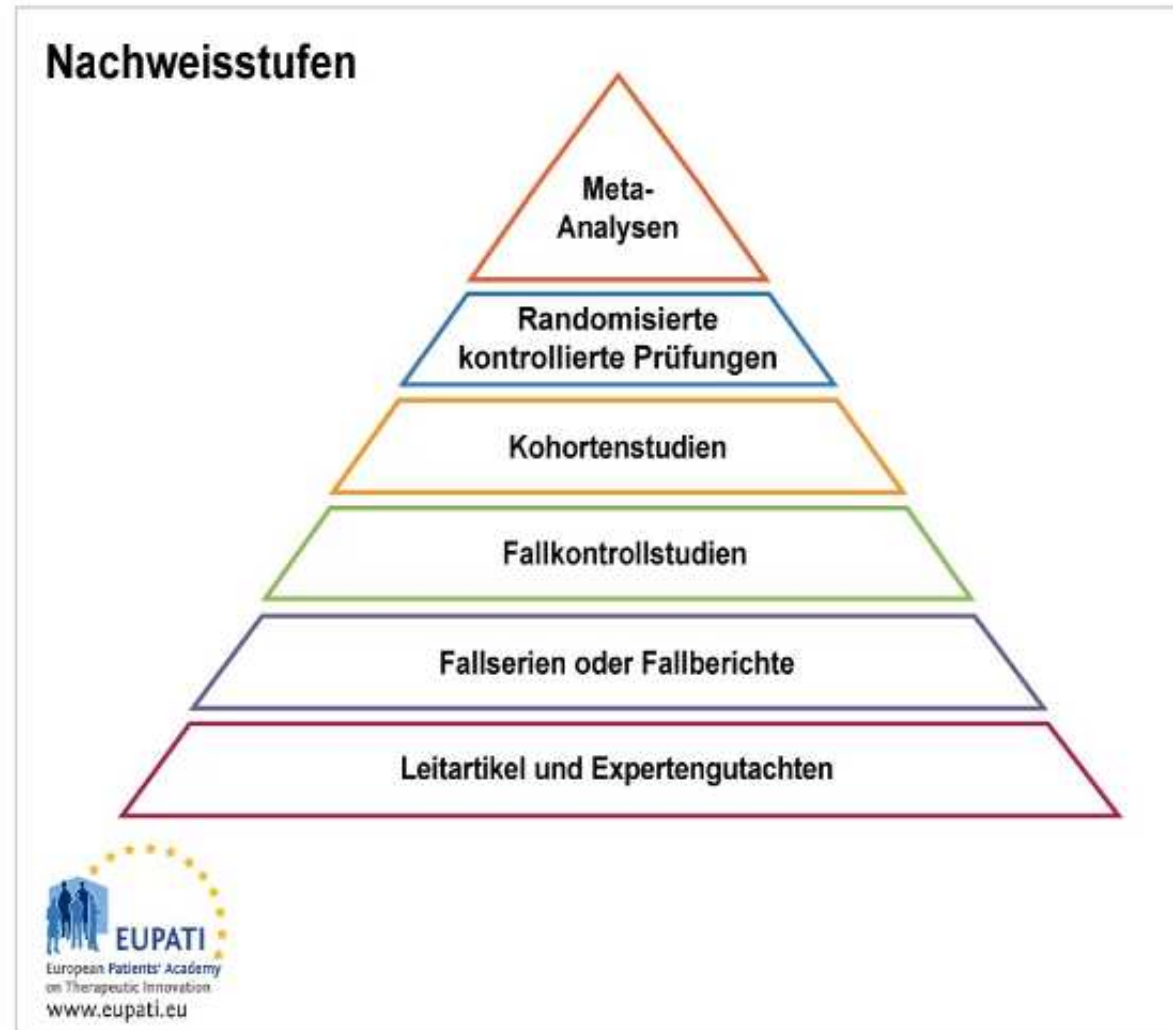


[See this image and copyright information in PMC](#)

Figure 2 Correlation of severity of amblyopia with compliance to occlusion therapy. There is a trend towards higher incidence of poor compliance in patients with severe amblyopia ($P = 0.97$; not significant)

Nachweisstufen

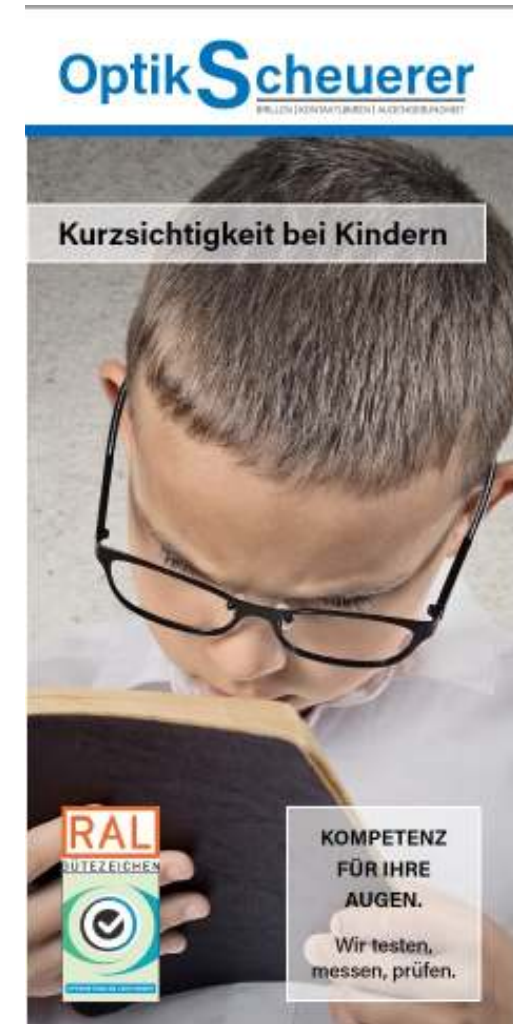
Eigene Erfahrungen vs.
Wissenschaft



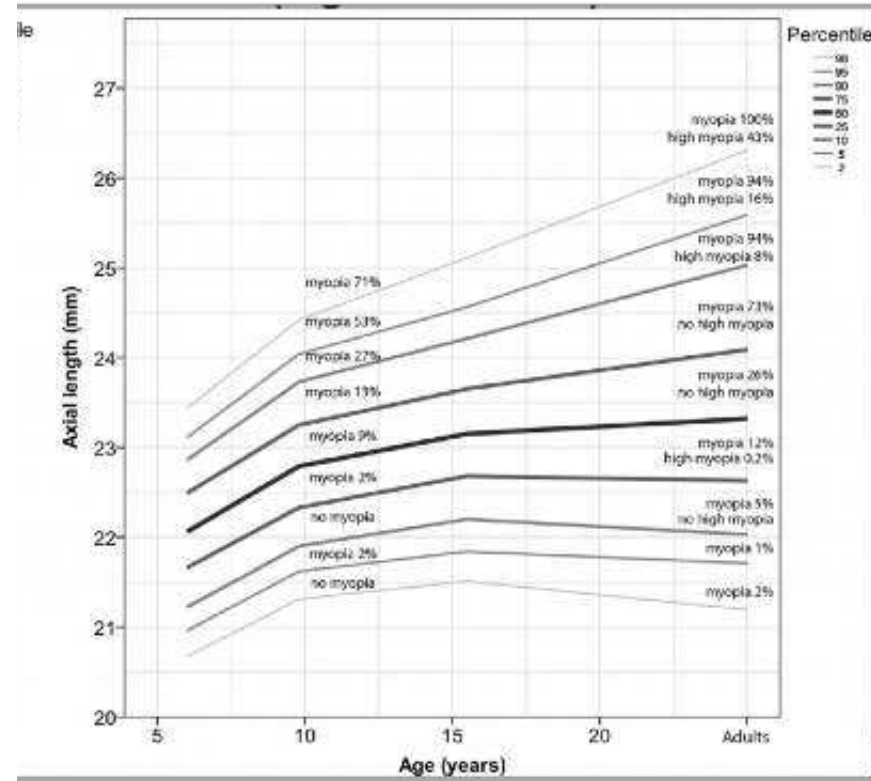
Nachteile RCT's

- „Real World Daten“ vs. Studien

Nicht immer muss alles evidenzbasierend sein, aber schön wenn es so ist.



Kommunikation - Achslängenmessung



Mädchen

Quelle: Tideman JWL, Polling JR, Vingerling JR, Jaddoe VW V., Williams C, Guggenheim JA, et al. Axial length growth and the risk of developing myopia in European children. *Acta Ophthalmol.* 2018 May;96(3):301–9

Kommunikation – Perzentile vs. Mittelwert

lfnr	Gehalt/h						
1	5,00 €	12		Point	Column1	Rank	Percent
2	4,00 €	16		20	100.000,00 €	1	100,00%
3	5,00 €	12		18	16,00 €	2	95,00%
4	2,00 €	21		15	15,00 €	3	90,00%
5	7,00 €	8		14	12,00 €	4	85,00%
6	6,00 €	10		10	11,00 €	5	70,00%
7	7,00 €	8		16	11,00 €	5	70,00%
8	4,00 €	16		17	11,00 €	5	70,00%
9	3,00 €	19		5	7,00 €	8	60,00%
10	11,00 €	5		7	7,00 €	8	60,00%
11	6,00 €	10		6	6,00 €	10	50,00%
12	3,00 €	19		11	6,00 €	10	50,00%
13	4,00 €	16		1	5,00 €	12	30,00%
14	12,00 €	4		3	5,00 €	12	30,00%
15	15,00 €	3		19	5,00 €	12	30,00%
16	11,00 €	5		21	5,00 €	12	30,00%
17	11,00 €	5		2	4,00 €	16	15,00%
18	16,00 €	2		8	4,00 €	16	15,00%
19	5,00 €	12		13	4,00 €	16	15,00%
20	100.000,00 €	1		9	3,00 €	19	5,00%
21	5,00 €	12		12	3,00 €	19	5,00%
				4	2,00 €	21	0,00%
Durchschnitt	4.768,67 €						
Stabw	21820,24004						

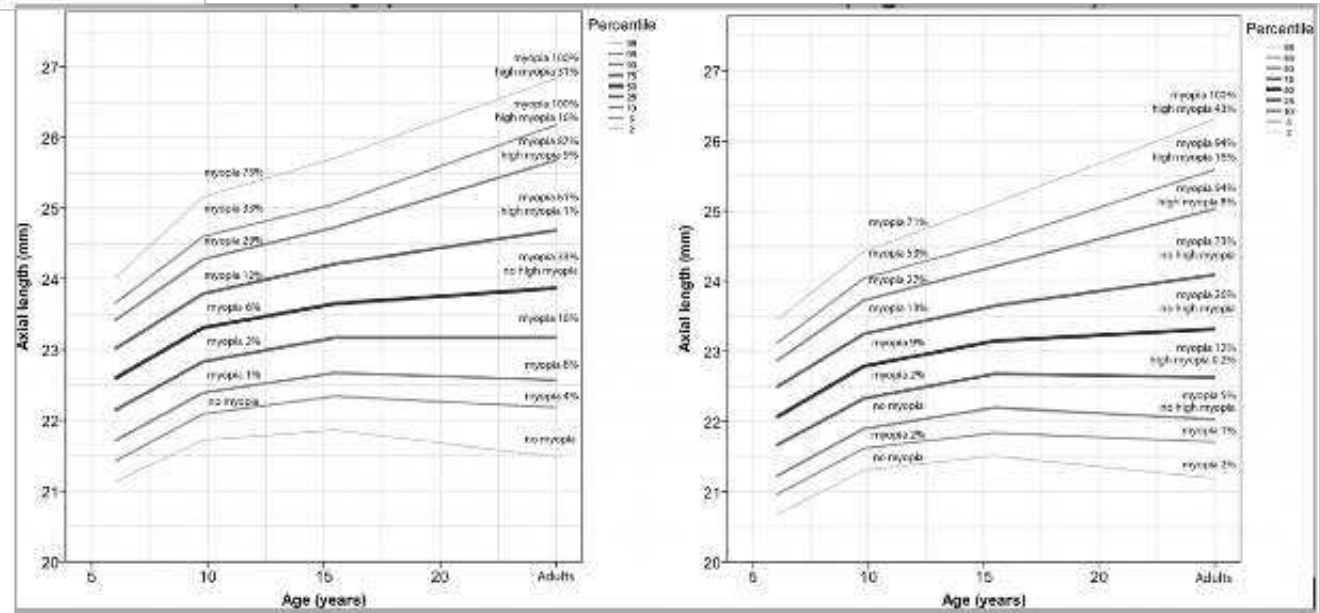
Biometrie geringere Standardabweichung wie Refraktion

Kommunikation

Optik Scheuerer

Augenlänge

Wachstum pro Jahr	6-9 Jahre	10-13 Jahre
Myopie	0,34mm	0,16mm
Emmetropie	0,19mm	0,09mm
Hyperopie	0,15mm	0,08mm



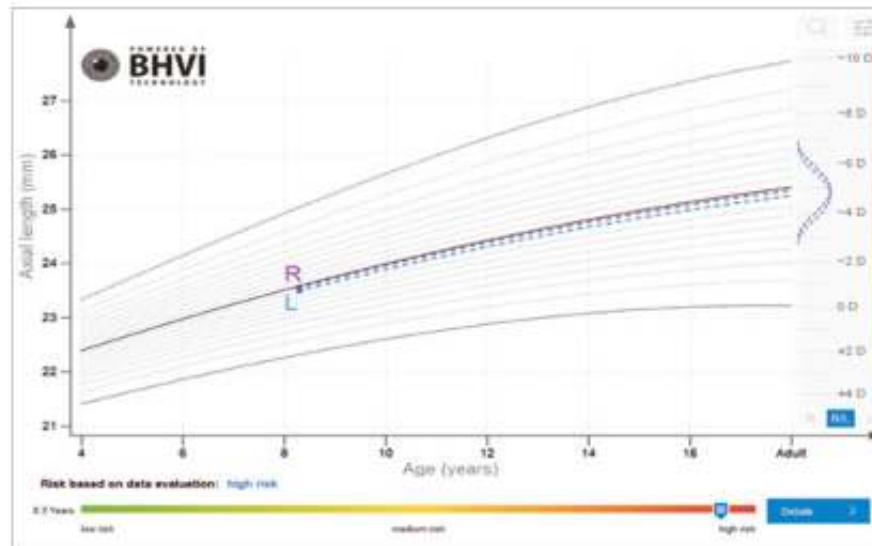
Jungen

Mädchen

Quelle: Tideman JWL, Polling JR, Vingerling JR, Jaddoe VW V., Williams C, Guggenheim JA, et al. Axial length growth and the risk of developing myopia in European children. *Acta Ophthalmol.* 2018 May;96(3):301–9

Kommunikation

Myopia Master®



Quelle: aufgerufen - 8.1.23 <https://www.myopia-master.com/en/>

Lenstar Myopia



Quelle: aufgerufen - 8.1.23 <https://www.haag-streit.com/de/haag-streit-deutschland/produkte/hs-diagnostics/biometrie/lenstar-myopia/>

Fallbeispiel 1 – transiente Myopie

Alter: 12

Auge: Rechts

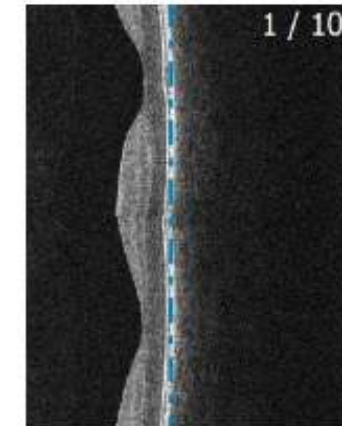
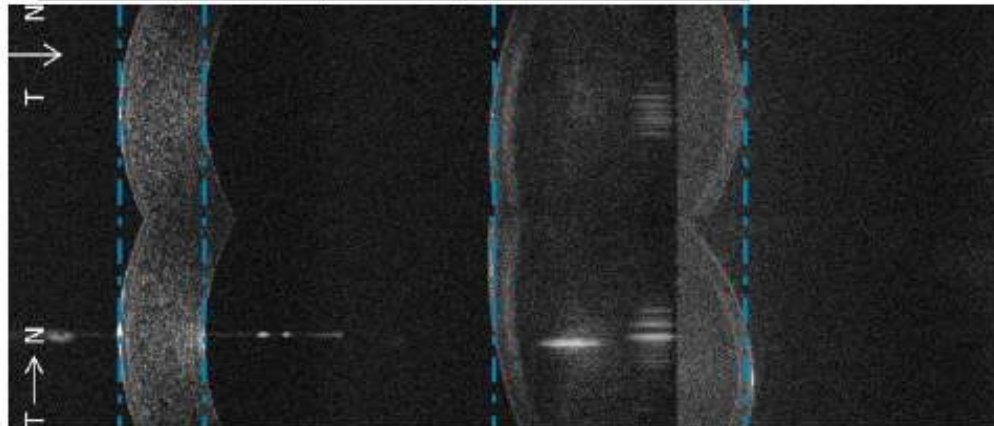
R

03.12.2021 15:39:32 QI: 8
Axiale Länge

BIOMETRIE | EINZELN

Augen Typ: Phakic (natural lens) Natürlich

Scan	AL [mm]	ACD [mm]	LT [mm]	CCT [mm]
# 1	21,99	3,55	3,36	0,587
✓ # 2	22,26	3,55	3,39	0,589
✓ # 3	22,20	3,57	3,39	0,589
✓ # 4	22,13	3,54	3,37	0,587
✓ # 5	22,23	3,55	3,43	0,587
✓ # 6	22,19	3,56	3,37	0,585
✓ # 7	22,25	3,59	3,39	0,585
✓ # 8	22,17	3,57	3,35	0,585
✓ # 9	22,17	3,60	3,36	0,585
✓ # 10	22,16	3,57	3,39	0,585
Ø	22,20	3,57	3,38	0,586
SA	0,04	0,02	0,03	0,002
Bereich	22,13 - 22,26	3,54 - 3,60	3,35 - 3,43	0,585 - 0,589



03.12.2021

massive Fernprobleme

R -0,75 Vcc 1,0

L -0,50-0,50A180 Vcc

Lt. Verordnung Augenarzt und eigener Messung

MEM-Skia: R,L -0,25 Nahphorie: XP

K-Werte: R 7,58/7,36

Fallbeispiel 1 – transiente Myopie

03.12.2021

massive Fernprobleme

R -0,75 Vcc 1,0

L -0,50-0,50A180 Vcc 1,0

Lt. Verordnung Augenarzt (mit Zyκλο) und eigener Messung

MEM-Skia: R,L -0,25 Nahphorie: XP

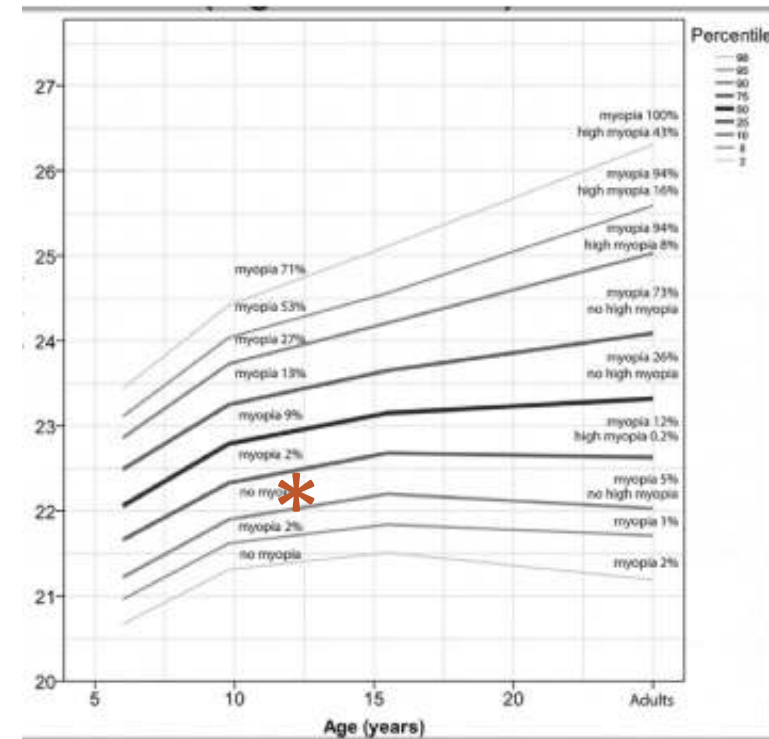
K-Werte: R 7,58/7,36

AXL 22,20mm

Verdacht auf Pseudomyopie!?

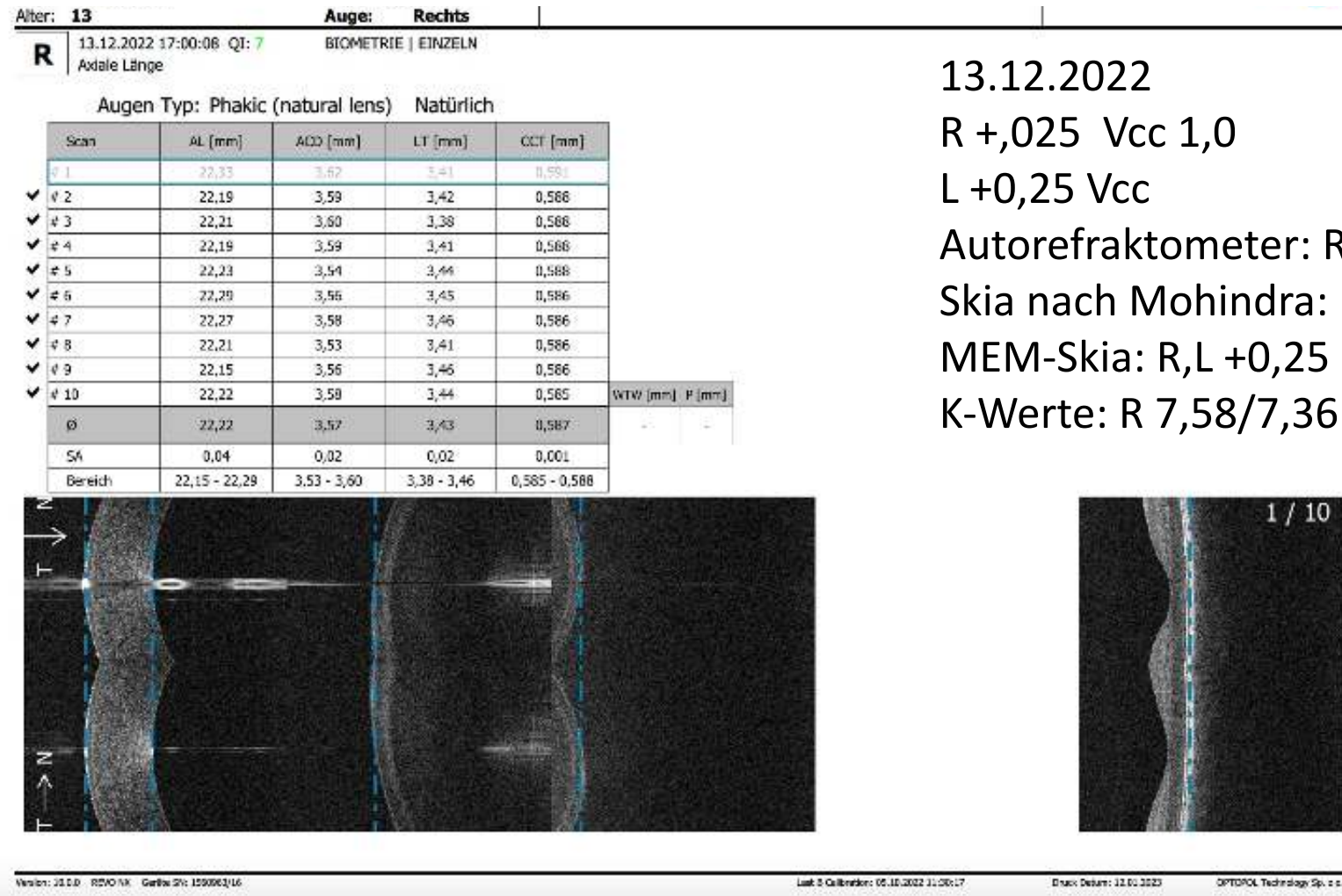
Plan:

- normale Brille, so selten wie möglich tragen
- möglichst „wenig Stärke“
- Aufklären + VT
- Kontrolle alle 6M.



Mädchen

Fallbeispiel 1 – transiente Myopie



13.12.2022

R +,025 Vcc 1,0

L +0,25 Vcc

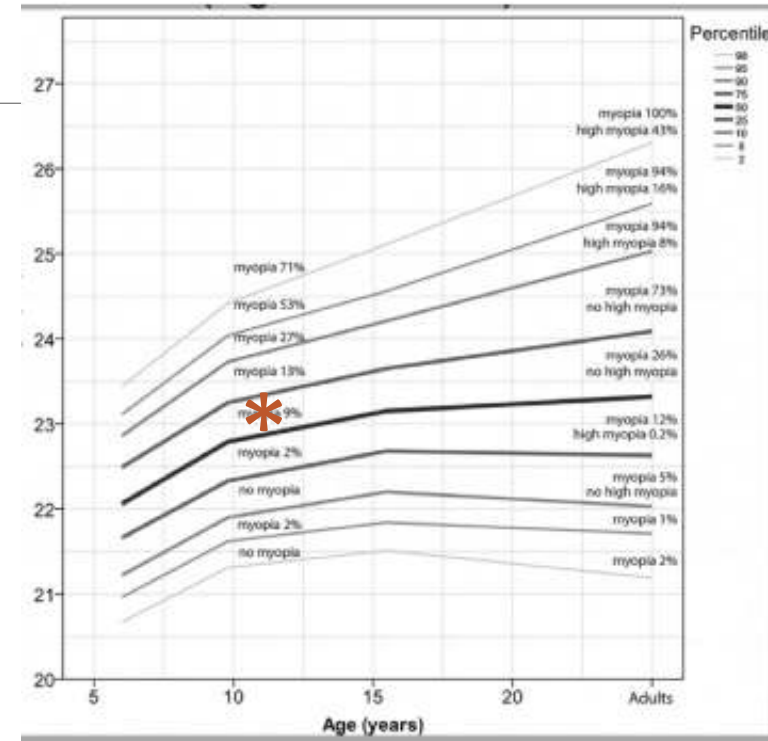
Autorefraktometer: R,L -1,00

Skia nach Mohindra: R,L +0,75

MEM-Skia: R,L +0,25 Nahphorie: XP

K-Werte: R 7,58/7,36

Fallbeispiel 2 – Myopie



Weiblich
Geb. 2010

Refraktion	Rechtes Auge	Linkes Auge
27.08.2020 SV	-0,50	-0,50
12.11.2020 SV	-1,00-0,50A99	-1,00
30.03.2021 (AXL 23,3/23,12)	-1,75-0,50A109	-1,50-0,25A91

Mädchen

← Miyosmart

Fallbeispiel 2 – Myopie

Weiblich
Geb. 2010

	Rechtes Auge	Linkes Auge
27.08.2020 SV	-0,50	-0,50
12.11.2020 SV	-1,00-0,50A99	-1,00
30.03.2021 (AXL 23,3/23,12)	-1,75-0,50A109	-1,50-0,25A91
17.02.2022 (AXL 23,46/23,37)	-1,75-0,50A106	-1,50-0,5079
12.08.2022 AXL (23,43/23,39)	-1,75-0,50A105	-1.50-0,25A85

Start Miyosmart

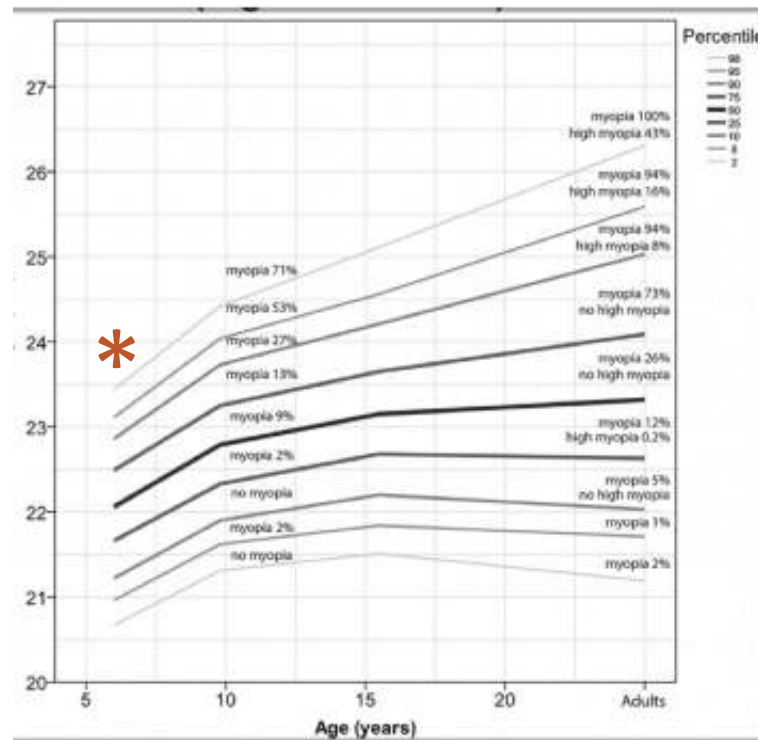


Fallbeispiel 3 – Myopie

Weiblich
Geb. 2015
Beide Eltern
ca. -10,00 Dpt

	Rechtes Auge	Linkes Auge
14.03.2022	0,00-0,50A110	-0,50-0,25A60

Maßnahmen sinnvoll?
Wird die Brille immer getragen?



Warum den binokularen Status erfassen?

Normales Binokular
Sehen

Kontaktlinsen
Miyosmart/Stellest
Atropin

Exophorie

Miyosmart/Stellest
Kontaktlinsen
Atropin
(VT/Prismen)

- Mit KI Exo-Shift
- Gefahr von Überkorrektur
- Erste Wahl: Miyosmart/Stellest

Lag of acc./
Naheso

Miyosmart/Stellest
Atropin
Kontaktlinsen
Bifokal

- Größere Progression ohne Maßnahmen?!
- Aber alle Maßnahmen scheinen besser zu wirken
 - Nahplus bringt mehr Komfort
- Bifokal eine Option aber wahrscheinlich geringere Wirkung als andere Maßnahmen
- Bei geringen Myopien evtl. ohne Brille lesen bzw. mit zu schwacher Brille

*Nur bei asthenopischen
Beschwerden oder Nahprobleme
eine Bifokalbrille*



Nahteilkante

Masterarbeit aus Aalen



Zu kaufen: www.visus.de

Take Home Messages

Take Home Messages

P-Wert “grob verstehen“

Welche Produkte bringen 50% Wirkung

Wo/wie kriege ich Informationen zu Studien/Arbeiten

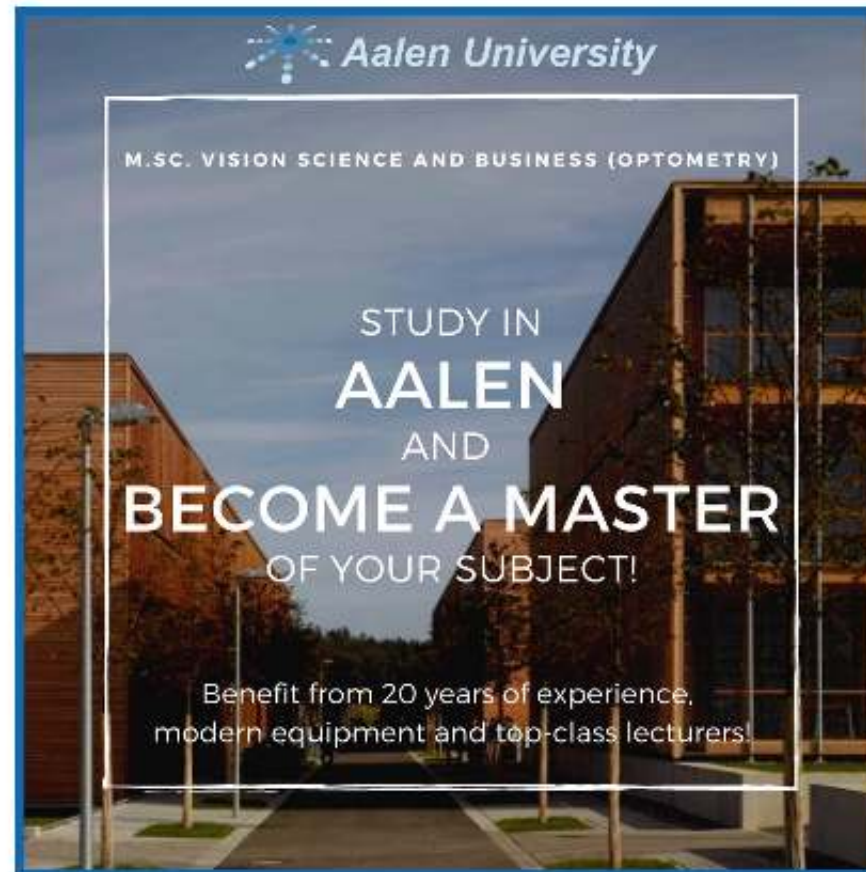
Kommunikation auch wissenschaftlich

....aber nicht nur wissenschaftlich

Weiterbildung: www.optometry-master.de



Impressionen aus Aalen





Fragen
