Myopie – Forschungs Up Date

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n|w

visionscience.ch
Entwicklung von Projekten und Konzepten

MYOPIA OK GmbH Switzerland

WVAO WISSENSFORUM 2021

Ein Blick zurück..

- Annahme bin in die neuere Zeit war, dass man Kurzsichtig wird oder nicht. Wenn man Kurzsichtig wird dann, kann man nichts dagegen machen.

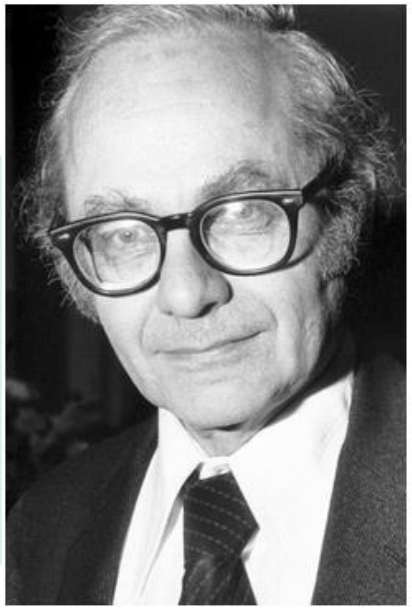
David H. Hubel
The Nobel Prize in Physiology or Medicine 1981

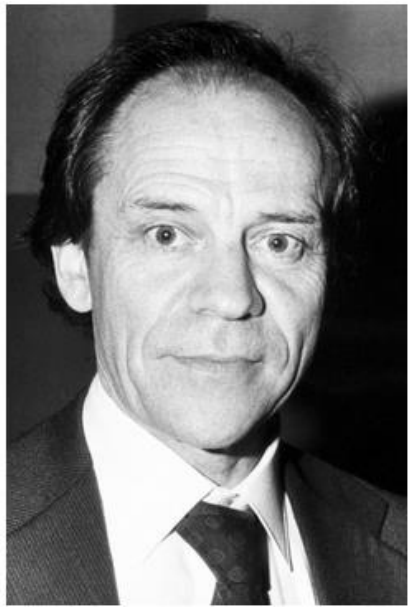
Born: 27 February 1926, Windsor, ON, Canada

Died: 22 September 2013, Lincoln, MA, USA

Affiliation at the time of the award: Harvard Medical School, Boston, MA, USA

Prize motivation: "for their discoveries concerning information processing in the visual system."





Torsten N. Wiesel
The Nobel Prize in Physiology or Medicine 1981

Born: 3 June 1924, Uppsala, Sweden

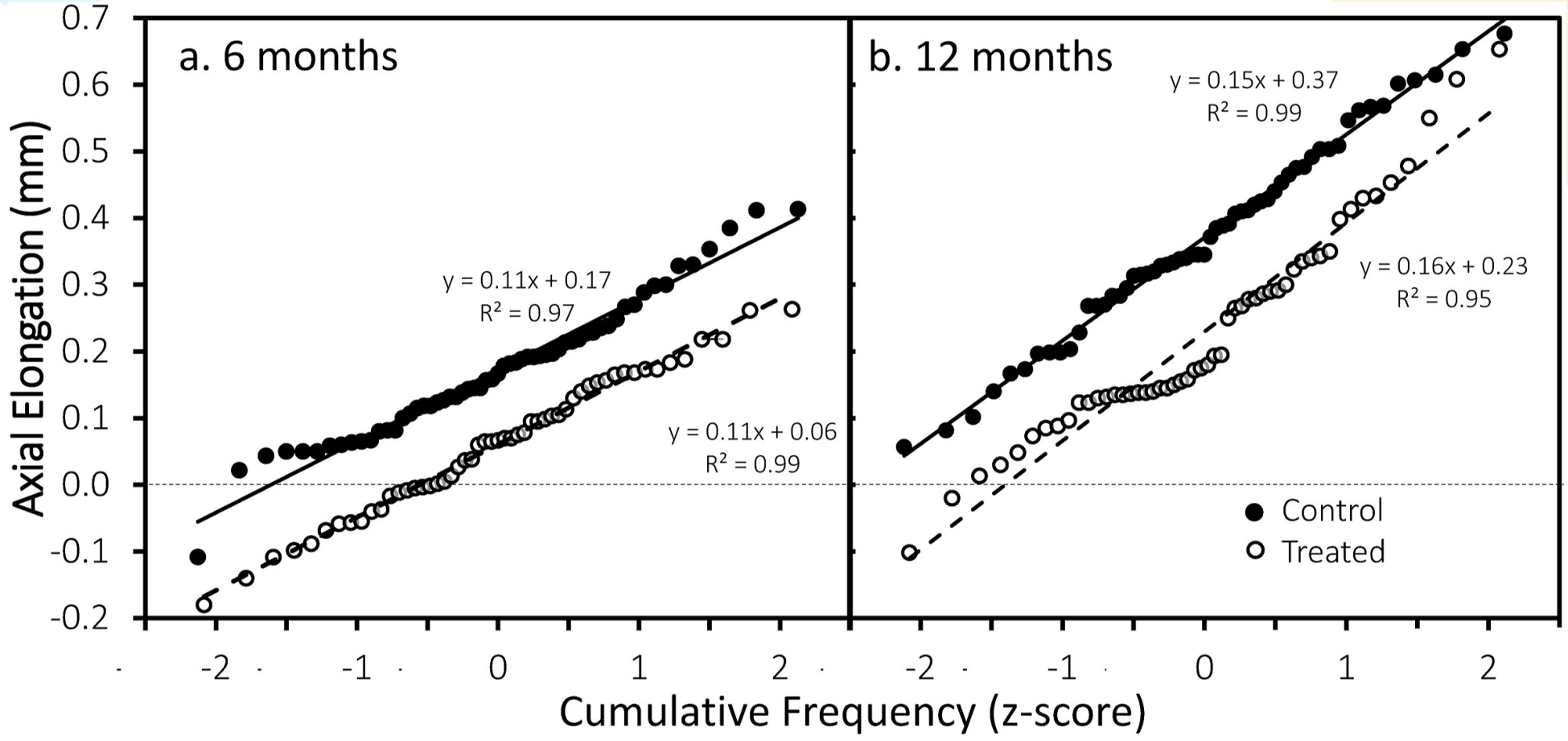
Affiliation at the time of the award: Harvard Medical School, Boston, MA, USA

Prize motivation: "for their discoveries concerning information processing in the visual system."

Präsentation der Daten

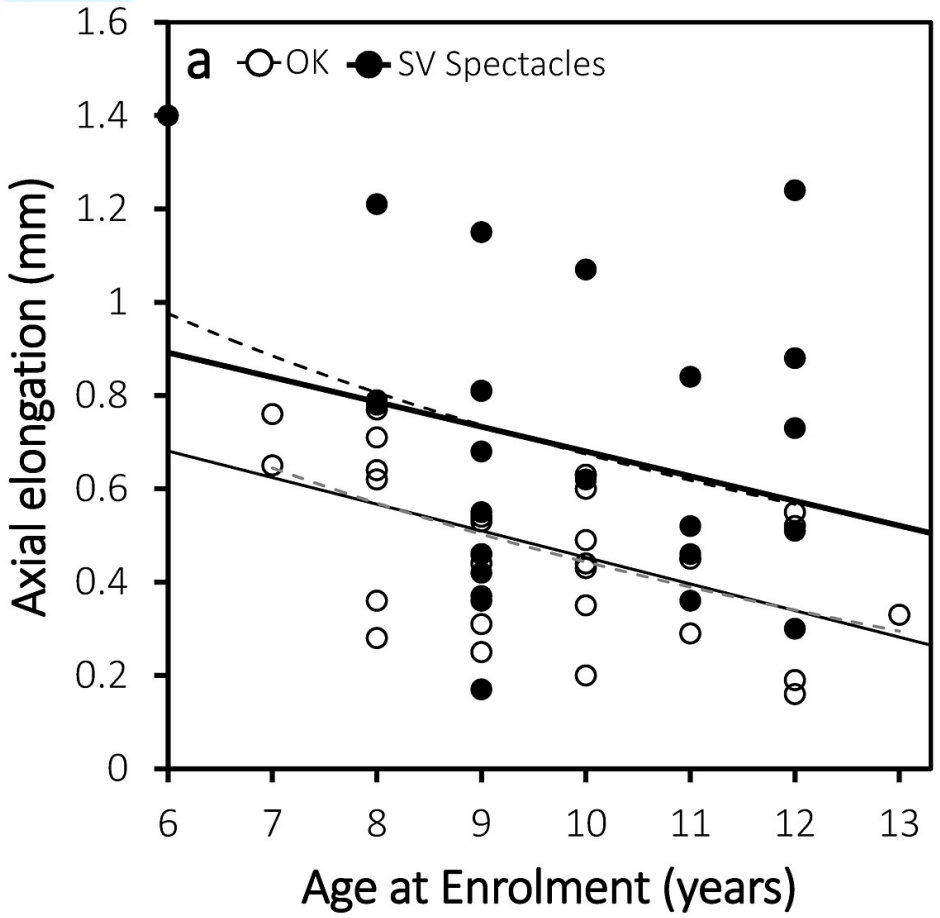
- Der Erfolg einer Myopiekontroll-Intervention ist das bremsen des längs Wachstum
- Refraktion ist weniger sensitiv und genau als Augenlänge
- Ist die %-Angabe zwischen Kontrollgruppe und Intervention Gruppe richtig?

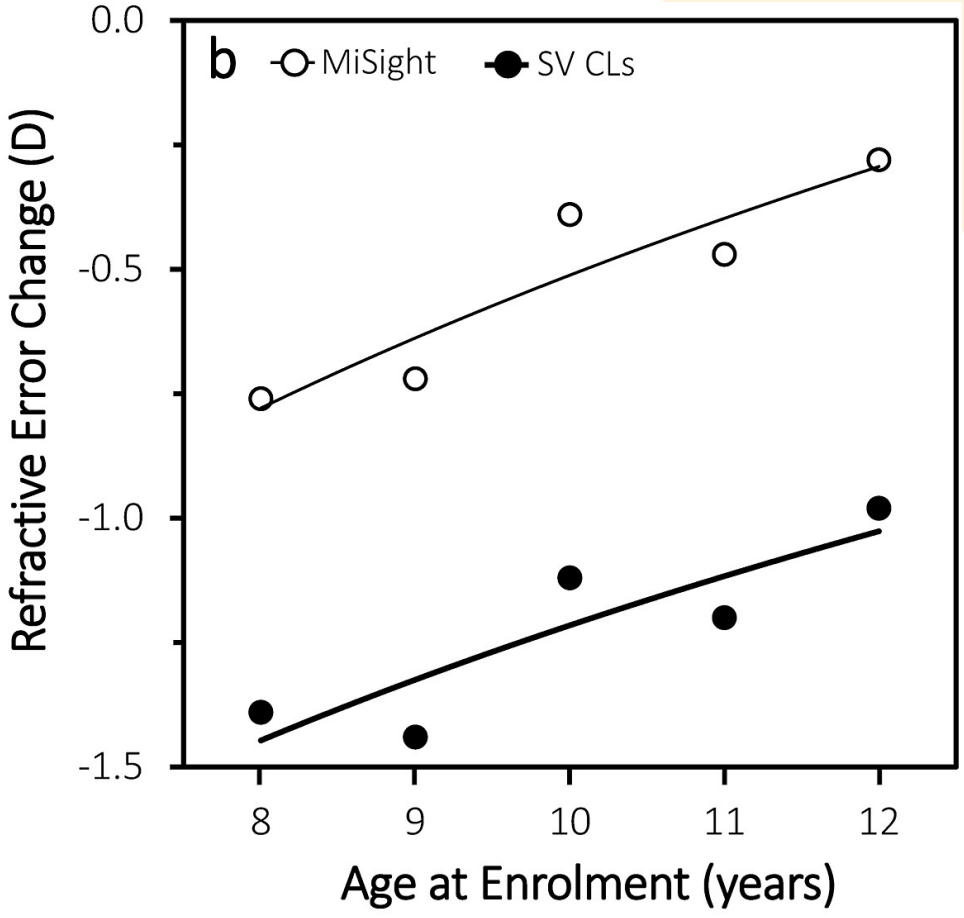
Cumulative absolute reduction in axial elongation (CARE), Brennen et al 2020



Daten von: X. Cheng, et al. **Soft contact lenses with positive spherical aberration for myopia control** Optom. Vis. Sci., 93 (2016), pp. 353-366

CARE





Santodomingo-Rubido et al 2013
(32%)

US FDA Approvel Study MySight 2019

Welche Möglichkeiten gibt es

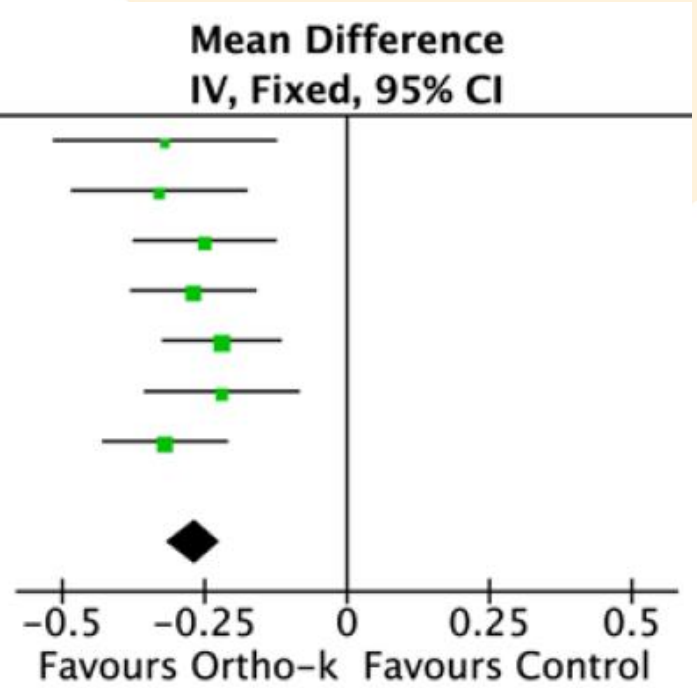
- Orthokeratologie
  - Die am längsten studierte optische Methode
  - Loric Studie von Pauline Cho 2005 – AL Differenz 0.25 mm
  - Genügend Daten vorhanden um Meta-Analysen durchzuführen
- Weiche Kontaktlinsen mit Simultaner Abbildung
  - Longitudinale Daten über mehr als drei Jahre
- Brillengläser (neu)
  - Zwei (drei) Jahres Daten, frisch auf dem Markt erhältlich
- Atropine Augentropfen
  - Diskussion / Unsicherheit welche Konzentration und Wirkort

Ortho-K

Study or Subgroup	Ortho-K Mean	Ortho-K SD	Ortho-K Total	Control Mean	Control SD	Control Total	Weight	Mean Difference IV, Fixed, 95% CI
Charm 2013	0.19	0.21	12	0.51	0.32	16	5.9%	-0.32 [-0.52, -0.12]
Chen 2013	0.31	0.27	35	0.64	0.31	23	9.5%	-0.33 [-0.49, -0.17]
Cho 2005	0.29	0.27	35	0.54	0.27	35	14.3%	-0.25 [-0.38, -0.12]
Cho 2012	0.36	0.24	37	0.63	0.26	41	18.6%	-0.27 [-0.38, -0.16]
Kakita 2011	0.39	0.27	42	0.61	0.24	50	20.6%	-0.22 [-0.33, -0.11]
Santodomingo 2012	0.47	0.23	29	0.69	0.27	24	12.3%	-0.22 [-0.36, -0.08]
Walline 2009	0.25	0.19	28	0.57	0.23	28	18.8%	-0.32 [-0.43, -0.21]
Total (95% CI)			**218**			**217**	**100.0%**	**-0.27 [-0.32, -0.22]**

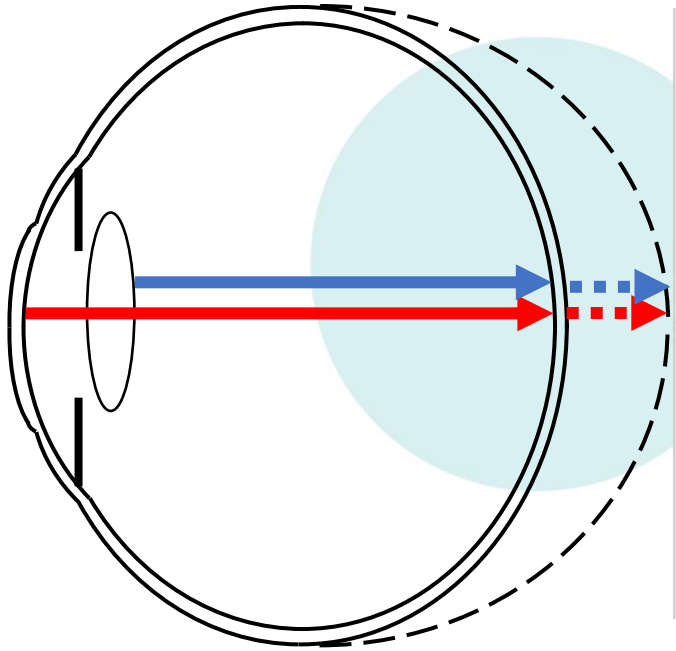
Heterogeneity: $Chi^2 = 3.08$, $df = 6$ ($P = 0.80$); $I^2 = 0\%$

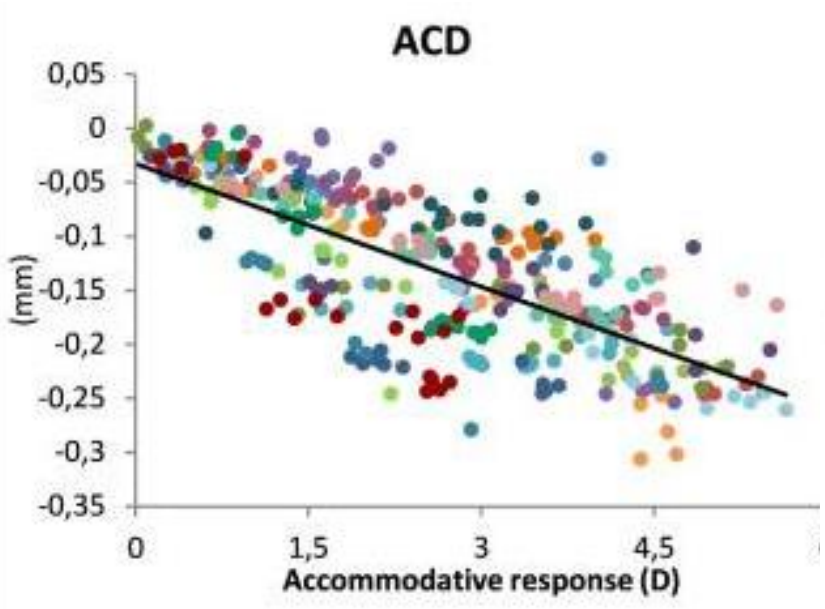
Test for overall effect: $Z = 11.01$ ($P < 0.00001$)

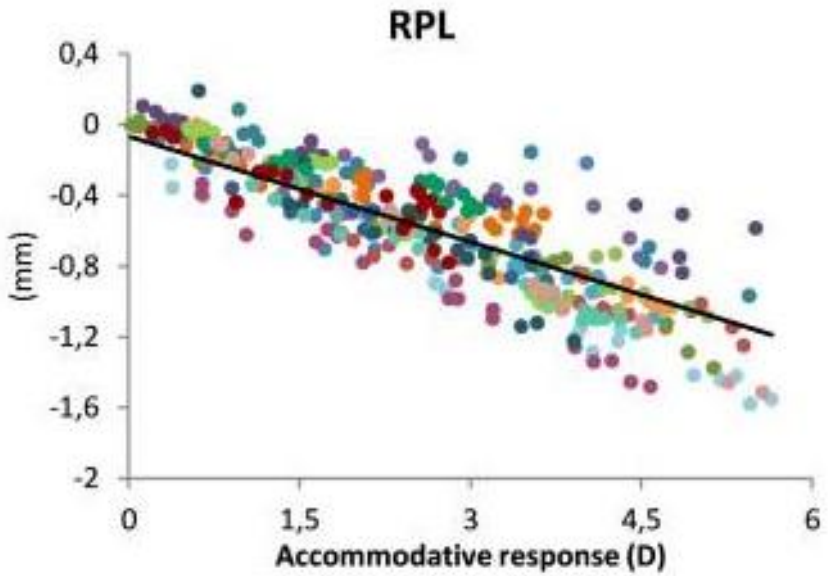


Objektive Kontrolle der Progression

- Achsenlänge oder Glaskörpertiefe, Repetition 0.006mm (Buckhurts at al. 2009)
- AL ist einer valide Messung für MC (Cheung & Cho 2013)



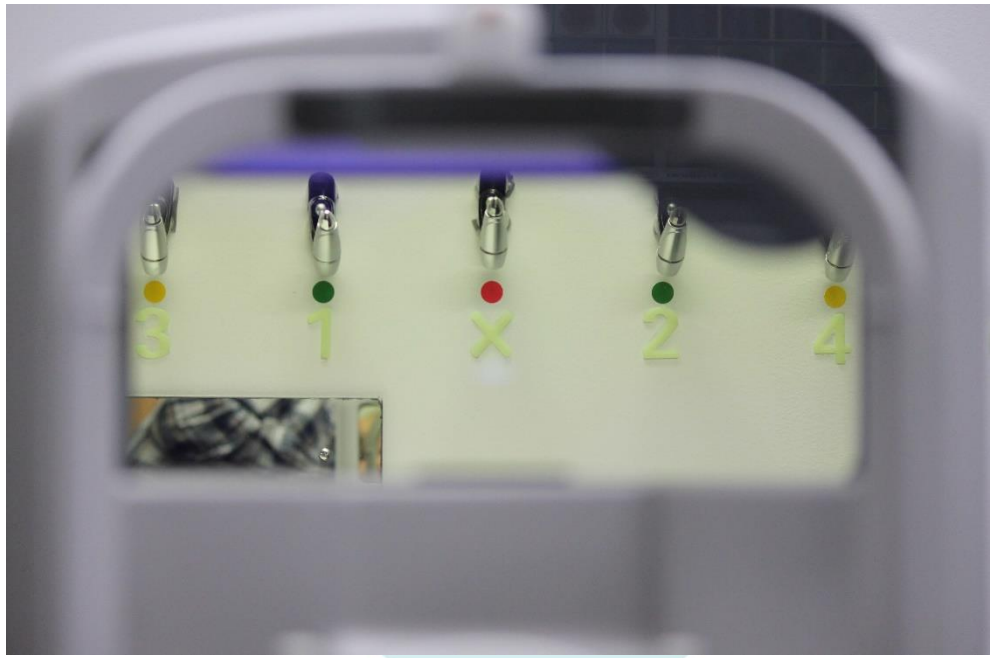




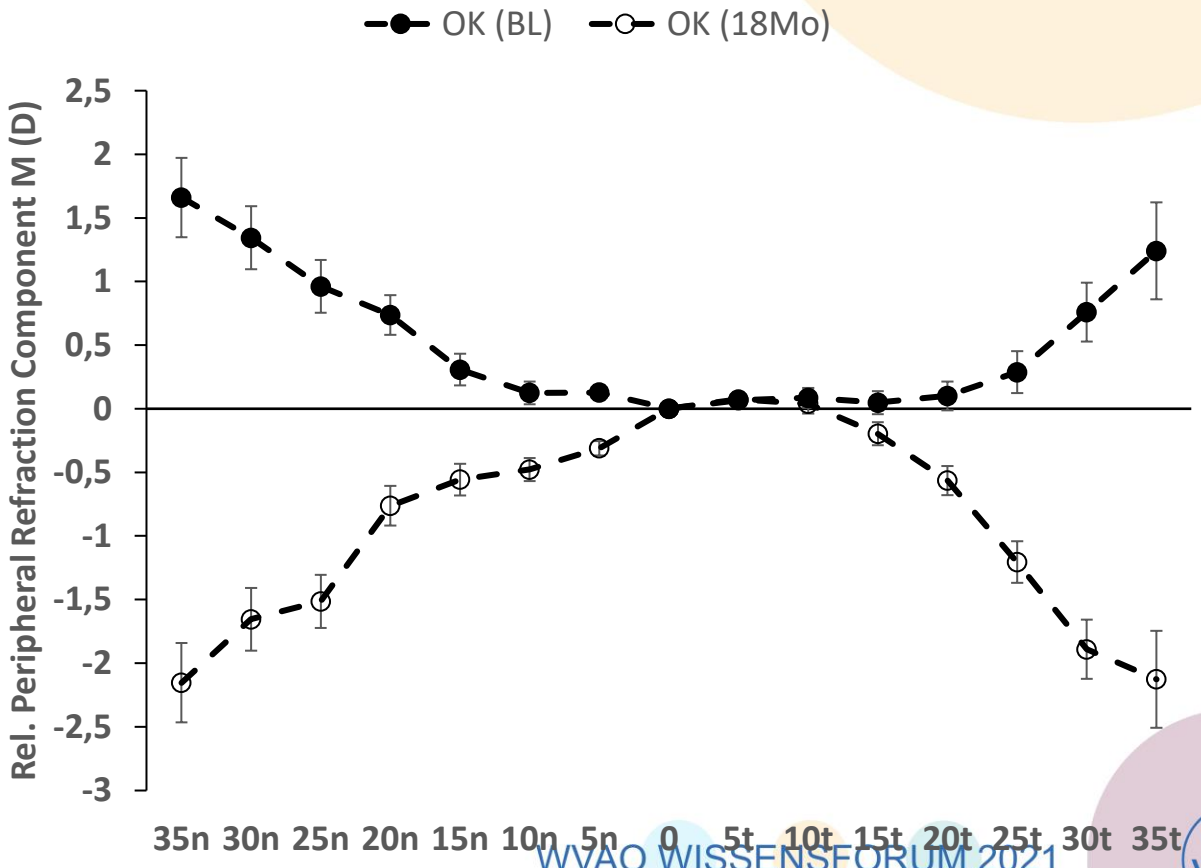
Martinez-Enriquez et al 2017

Wirkmechanimus Ortho-K
Periphere Refraktion

Open-Field Autoref. Ist (war) der Standard der Publizierten Studien



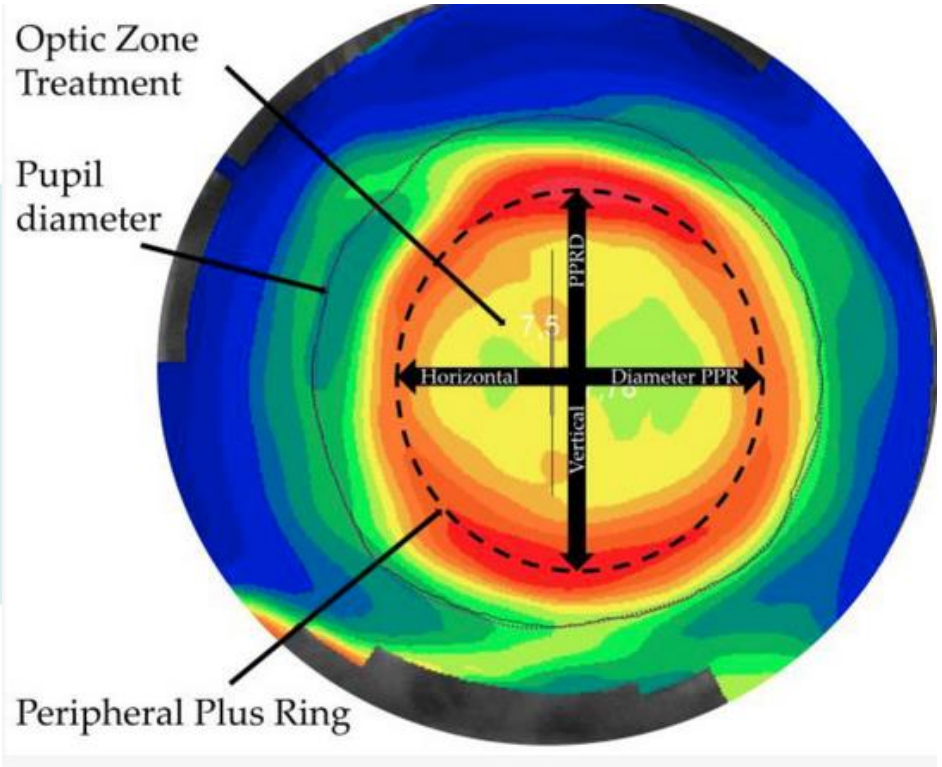
Scannbreite 2.3 mm



Klinische Auswirkung

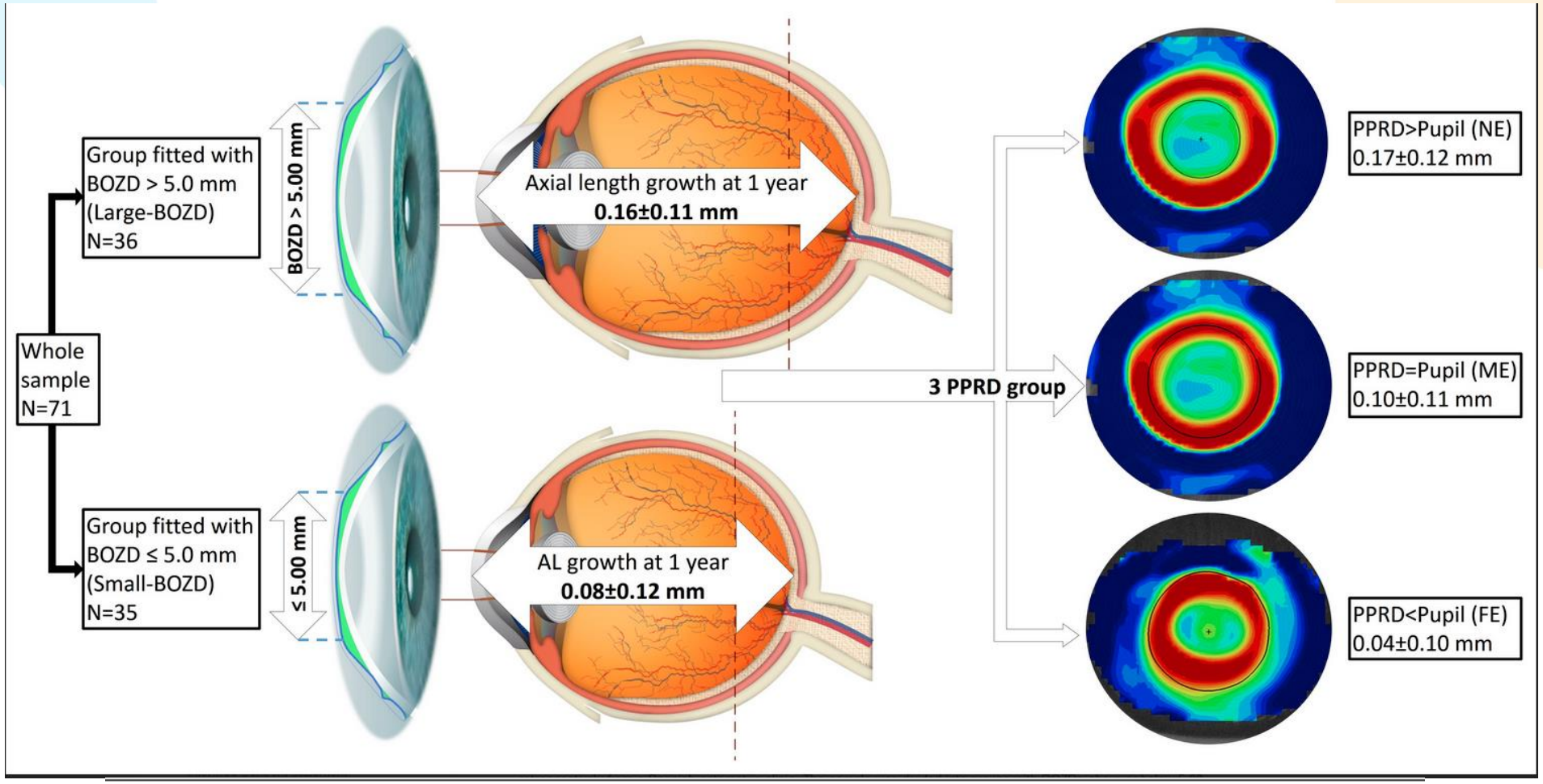
- Viele Myopie Kontrolle Verfahren versprechen eine Effekt anhand der Änderung in der Relativen Peripheren Refraktion (RPR)

Beispiel Ortho-K



Paume et al. *J. Clin. Med.* **2021**

Resultat



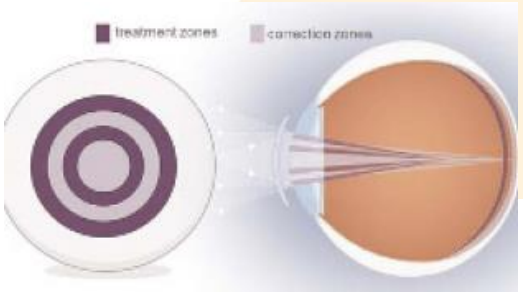
Axial Length (mm)	>5	24.69 ± 0.94	24.84 ± 0.96	0.16 ± 0.11
	≤5	24.61 ± 0.83	24.69 ± 0.85	0.08 ± 0.12
	p	0.723 ‡	0.488 ‡	0.007 ‡

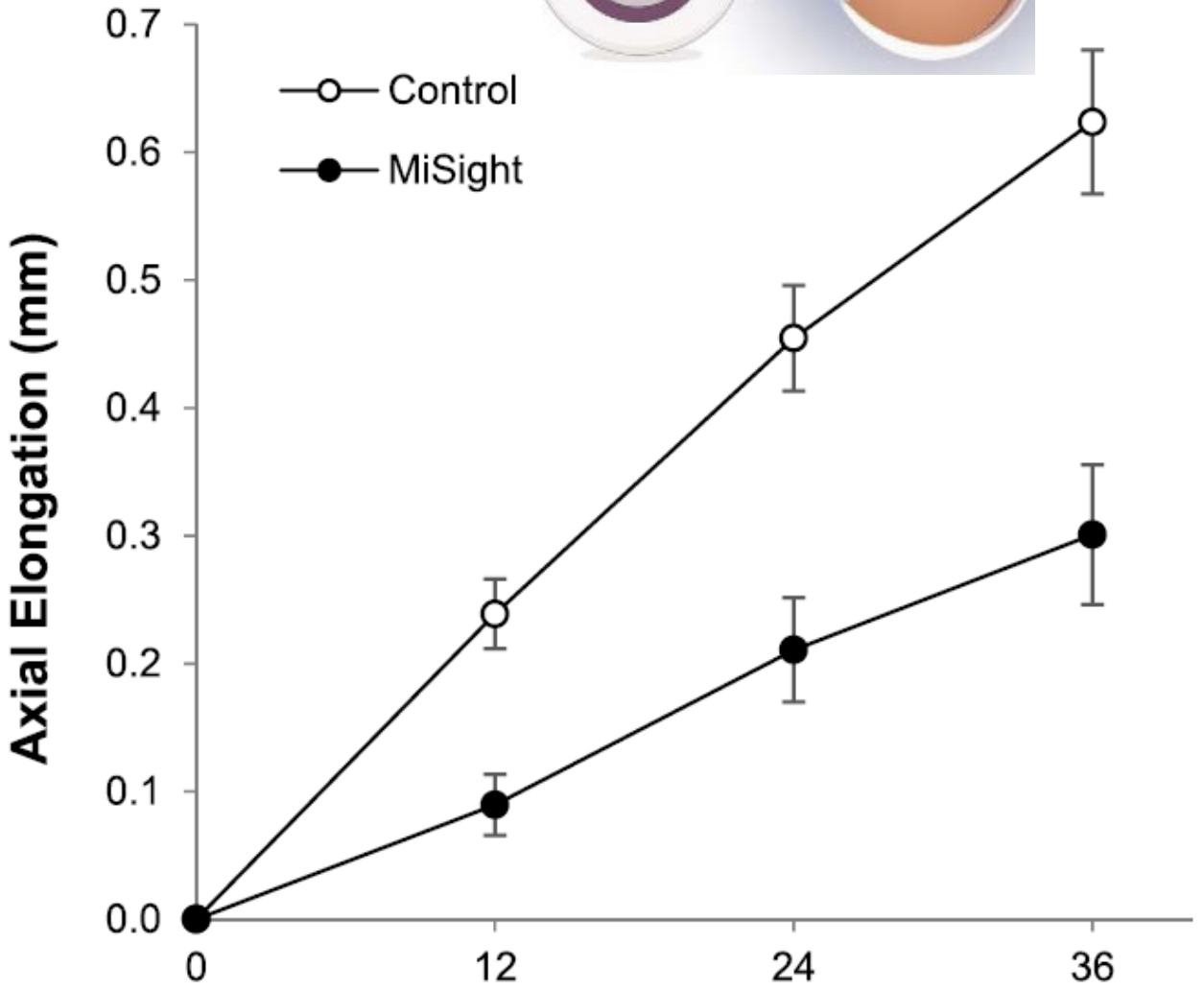
MySight

- Multizenter, Zwei-Armig, Zweifach-Verblindet, Randomisiert
  - ClinicalTrials.gov identifier: NCT01729208
- Teilnehmer 144, davon 109 über drei Jahre (53 test, 56 control).
- Refraktion: −0.73 D (59%) weniger progression als die Kontrollgruppe
  - (−0.51 ± 0.64 vs. −1.24 ± 0.61 D, P < .001).
- Augenlänge: 0.32 mm (52%) weniger als die Kontrollgruppe
  - (0.30 ± 0.27 vs. 0.62 ± 0.30 mm, P < .001).

MySight Tages KL

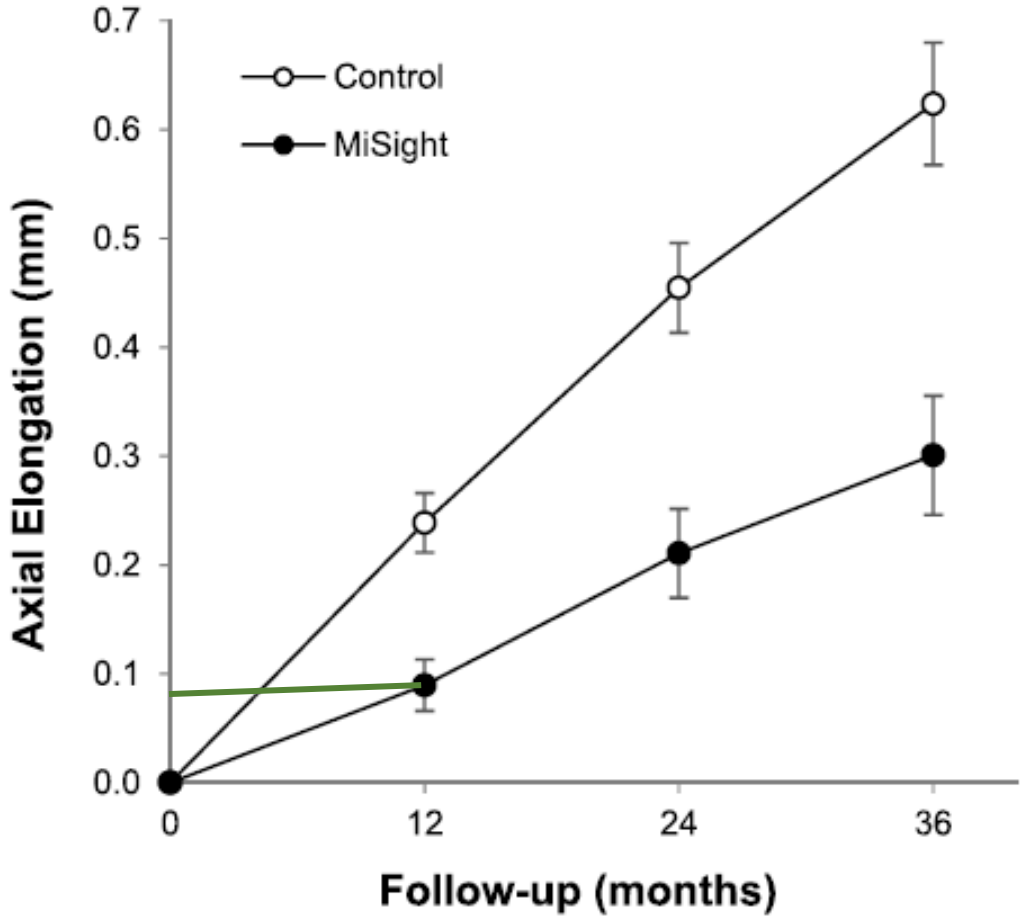
- 3-jahres Daten MySight
- Infektionsrisiko mit KL in Kinder ist gering. Innerhalb von 6 Jahren keine schweren KL Komplikationen Wood et al. 2021 https://doi.org/10.1016/j.clae.



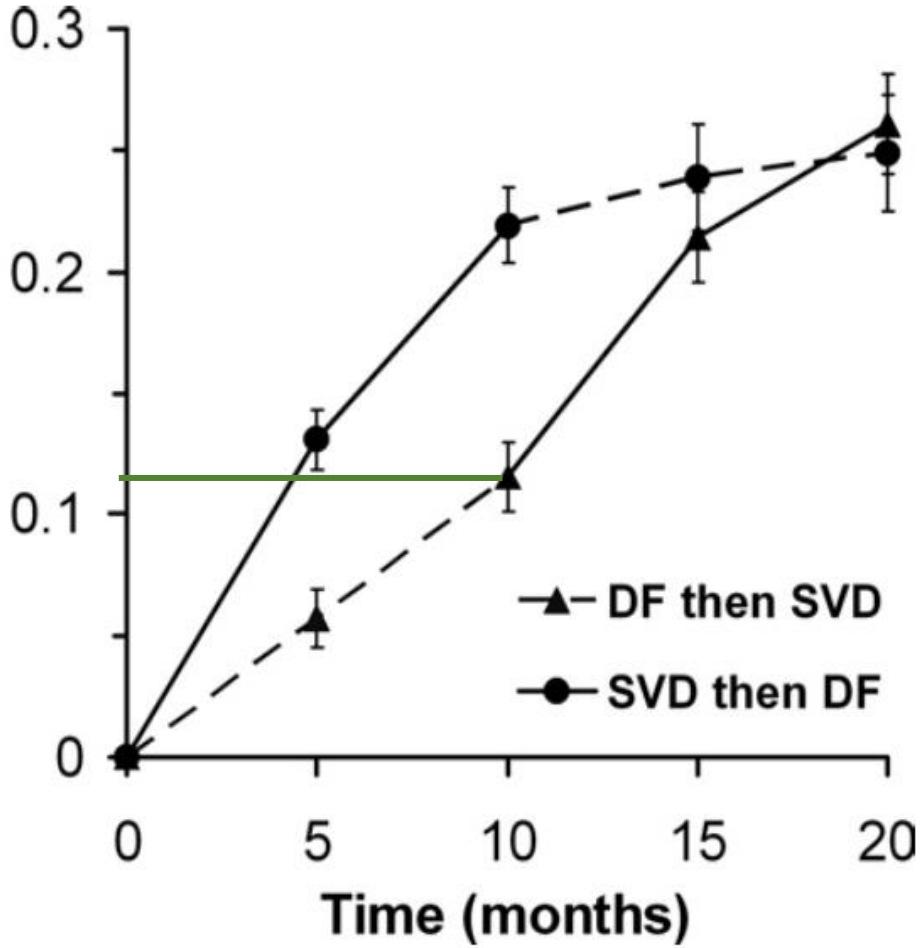


Chamberlain et al. Optom Vis Sci 2019

Vergleich Bilateral vs Monokular



Chamberlain et al. Optom Vis Sci 2019



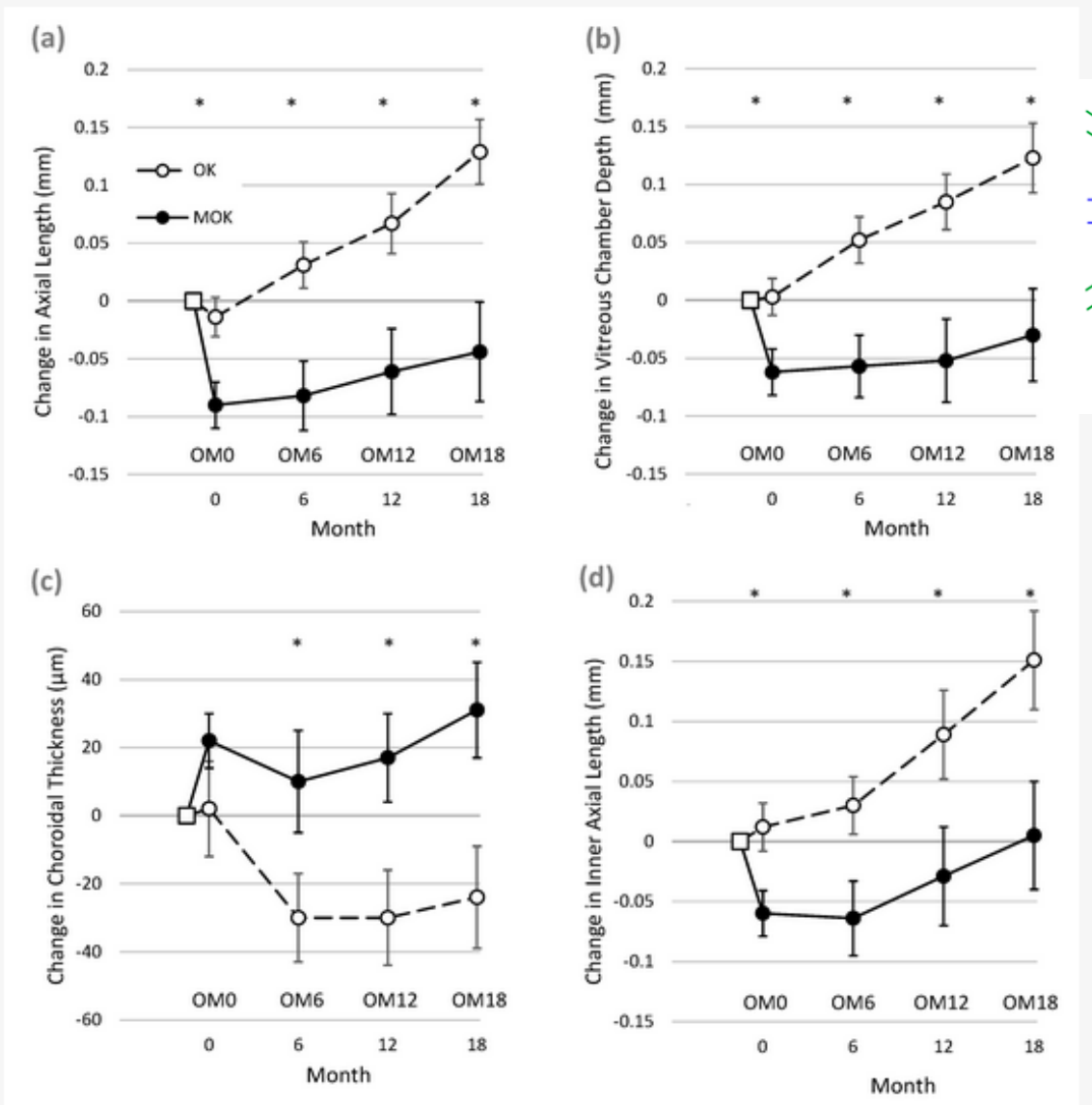
Anstice & Phillips Ophtalmology 2011

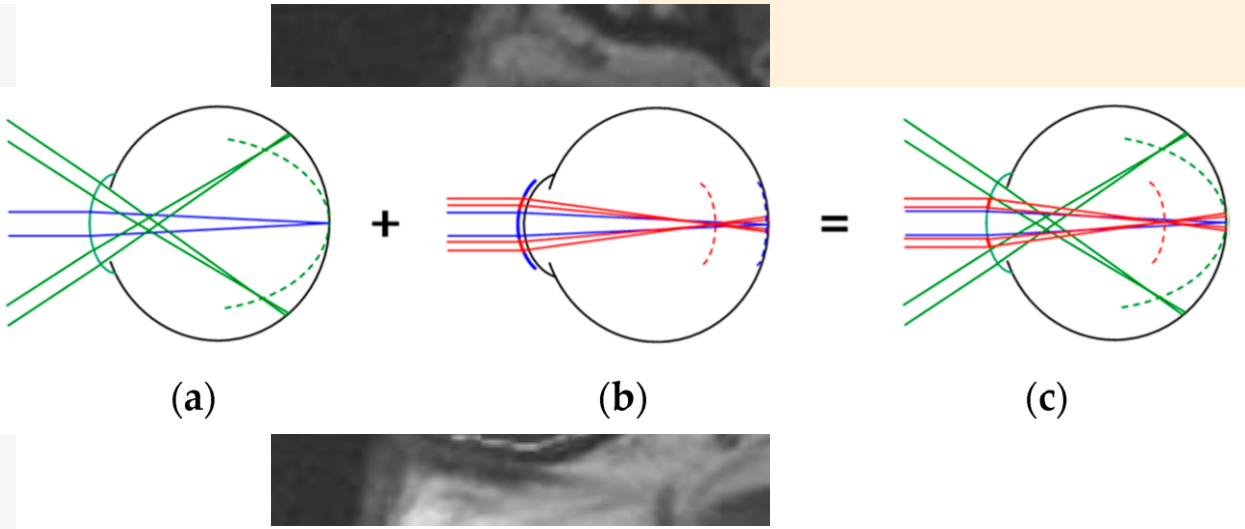
Multifokale Orthokeratologie (MOK)

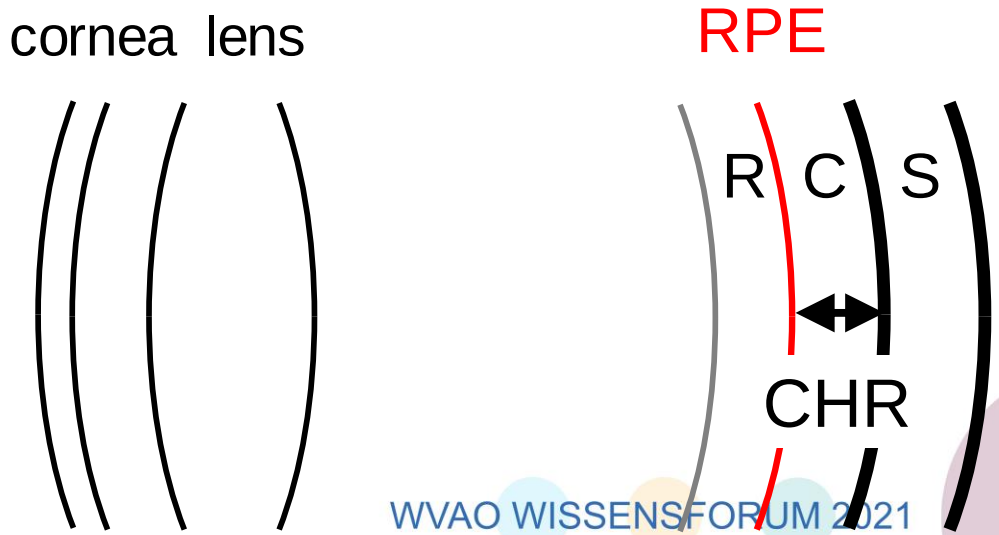
Baseline Measure	MOK Eye Mean (SD) $n = 30$	OK Eye Mean (SD) $n = 30$	p
Visual Acuity (LogMAR)	0.01 (0.02)	0.00 (0.02)	0.59 (WSRT)
Pelli–Robson Contrast Sensitivity	1.63 (0.09)	1.64 (0.06)	0.50 (WSRT)
Pupil Diameter (mm)	4.74 (0.70)	4.81 (0.68)	0.436
Mean Sphere (D)	−2.72 (0.39)	−2.68 (0.80)	0.81
Progression in Last 6 Months (D/yr)	−0.96 (0.39)	−0.88 (0.34)	0.12 (WSRT)
Axial Length (mm)	24.57 (0.73)	24.53 (0.74)	0.237
Vitreous Chamber Depth (mm)	17.38 (0.79)	17.36 (0.79)	0.491
Anterior Chamber Depth (mm)	6.63 (0.22)	6.61 (0.21)	0.067
Inner Axial Length (mm)	24.28 (0.75)	24.24 (0.76)	0.262
Central Corneal Thickness (µm)	553 (34)	554 (32)	0.687
Choroidal Thickness (µm)	270 (61)	271 (63)	0.876

Loertscher, Phillips, Backhouse, J Clin. Med. 2021

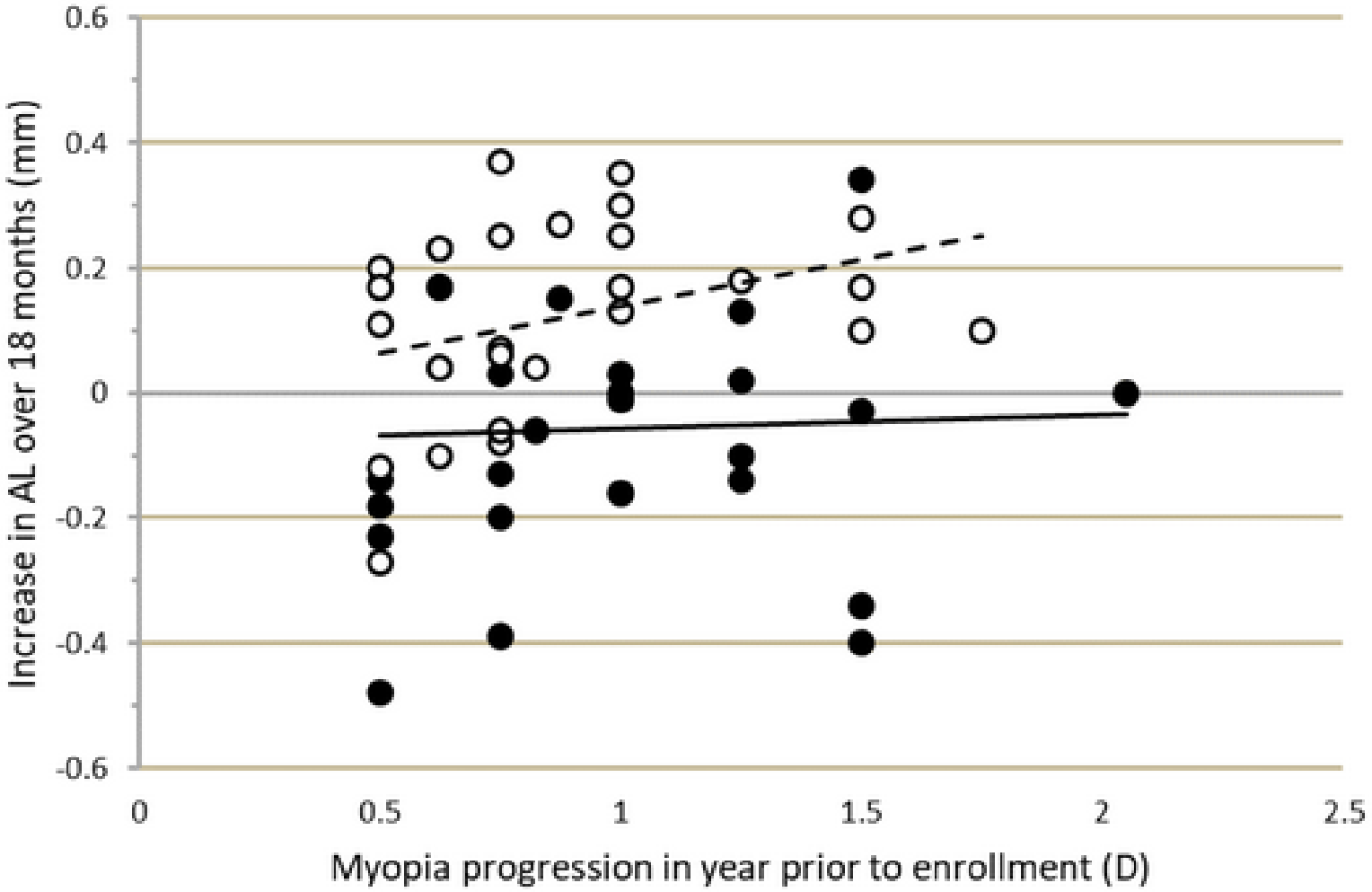
Biometrie Resultate







CARE Analyse



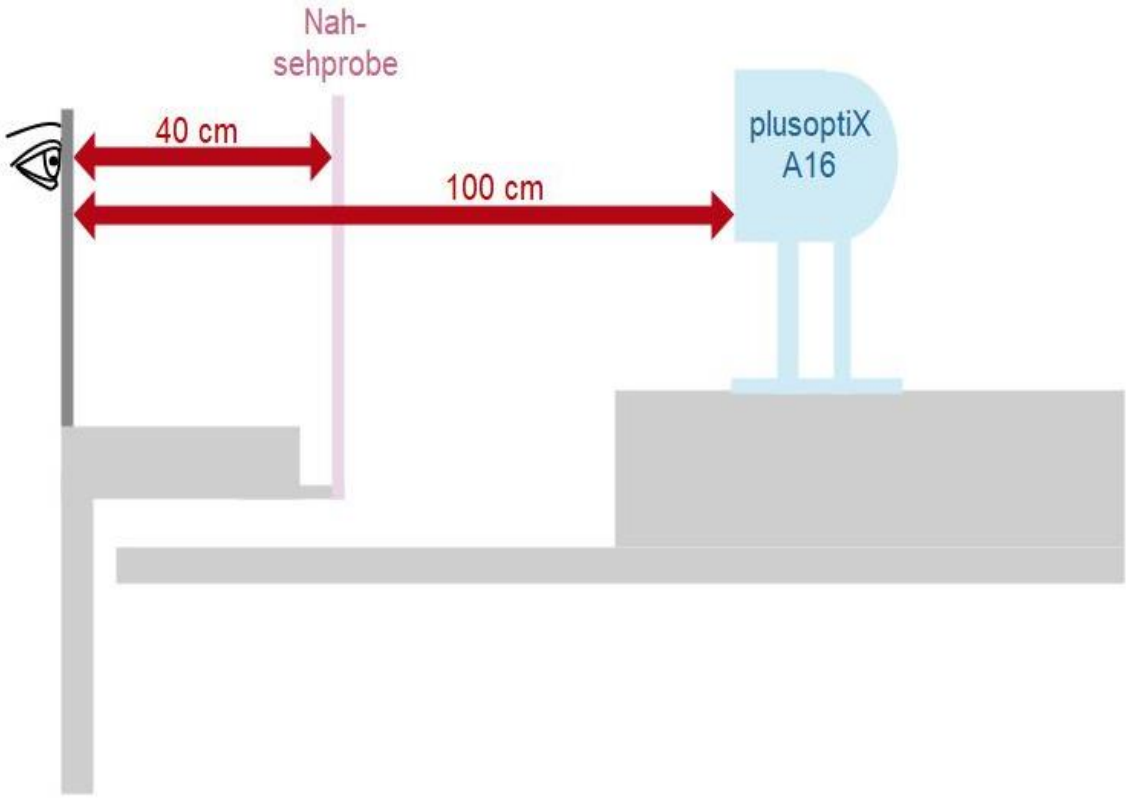
Simultane Abbildung und Akkommodation

- Teilnehmer: 7 M / 22 F alter 24.03 ± 2.73 Jahre
  Myopia von -0.50 to -4.00 D, Cyl max -1.00.
- Akkommodation in 40 cm
- Monofocal Proclear spheric, Cooper Vision, USA
  Multifoccal Proclear multifocal D Add 2.00, Cooper Vision, USA

- Ethikkommision Nortwestschweiz BASEC 2019-00329

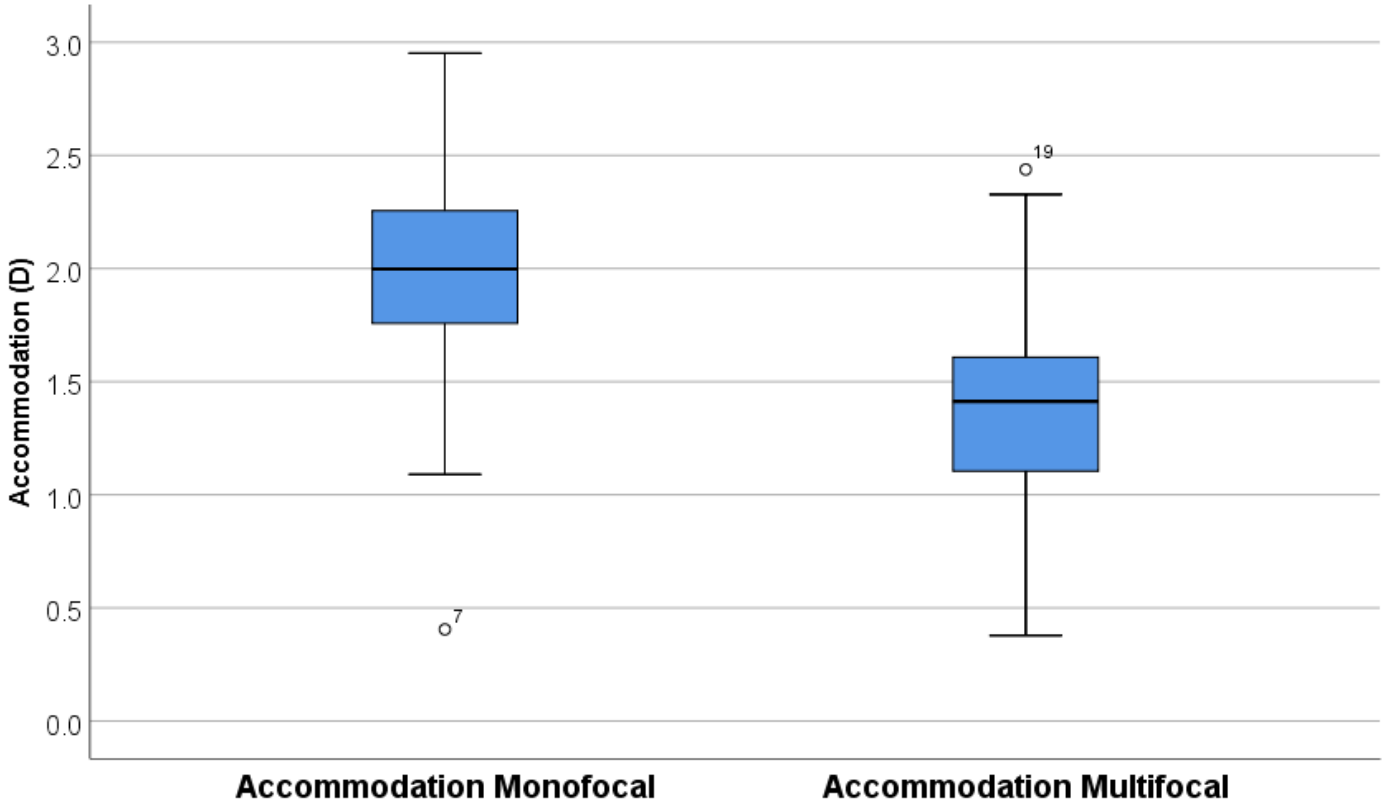
Testaufbau

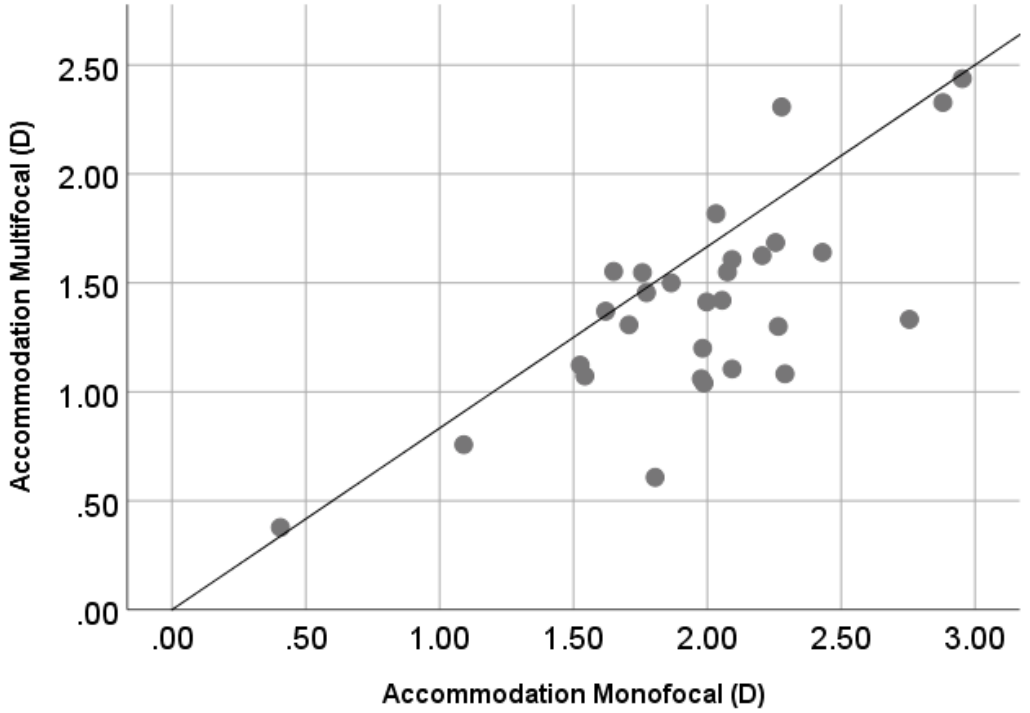
- Binokulares Photorefraktometer (Plus Optix Deutschland)



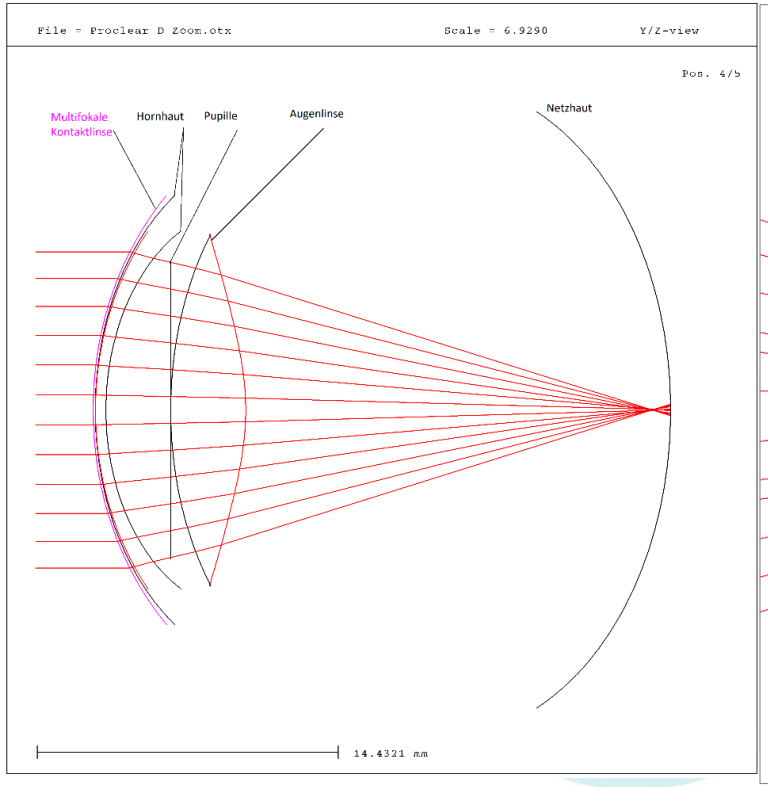
Resultat Akkommodation

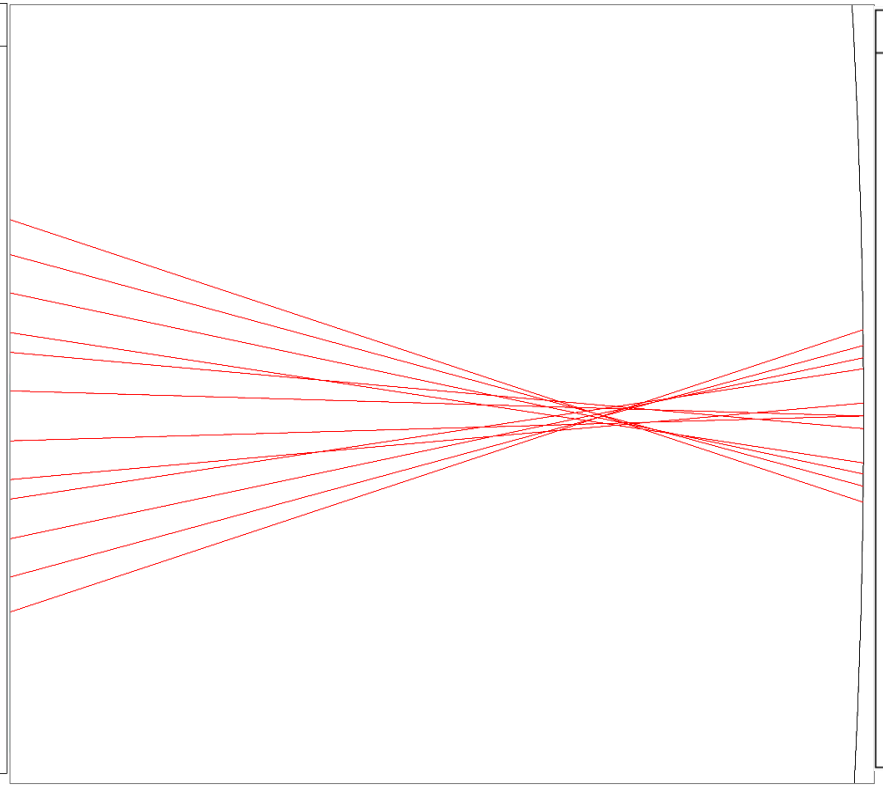
- Mean difference 0.576 ± 0.36D, 95%CI (0.43 / 0.71), t 8.549 df 28, p ≤0.001

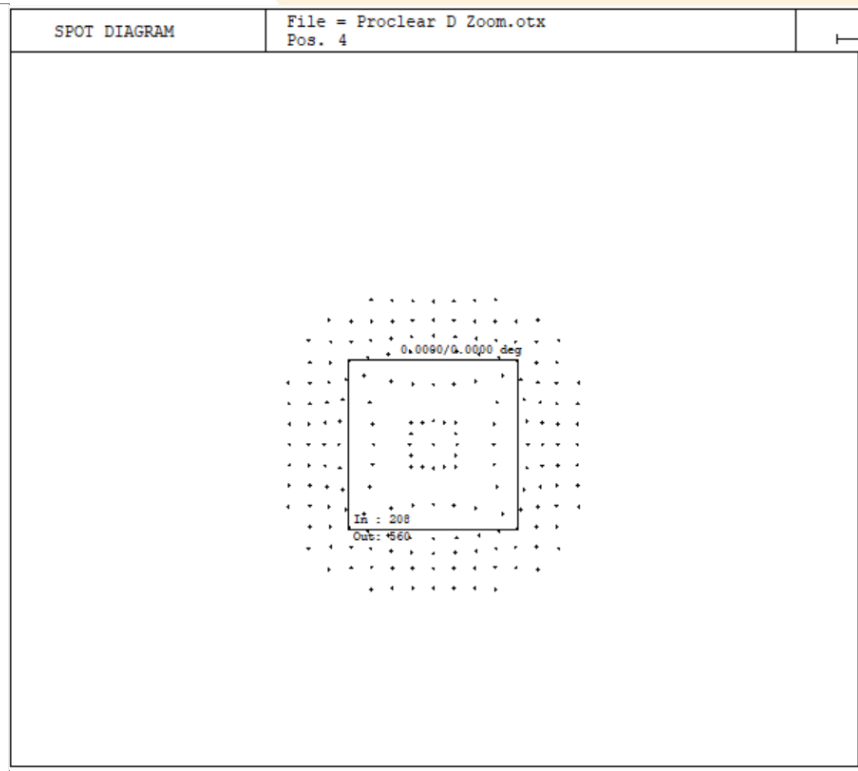




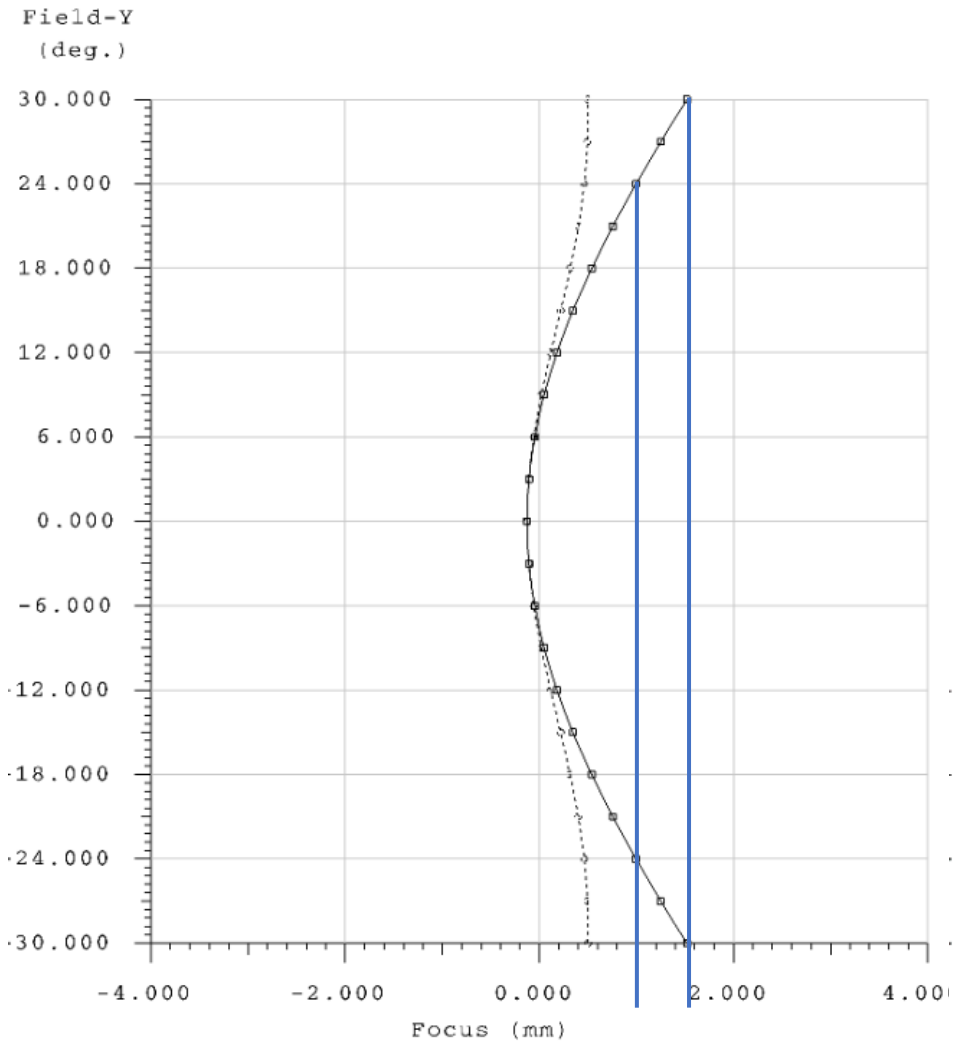
Optical Modelling - Distance Vision



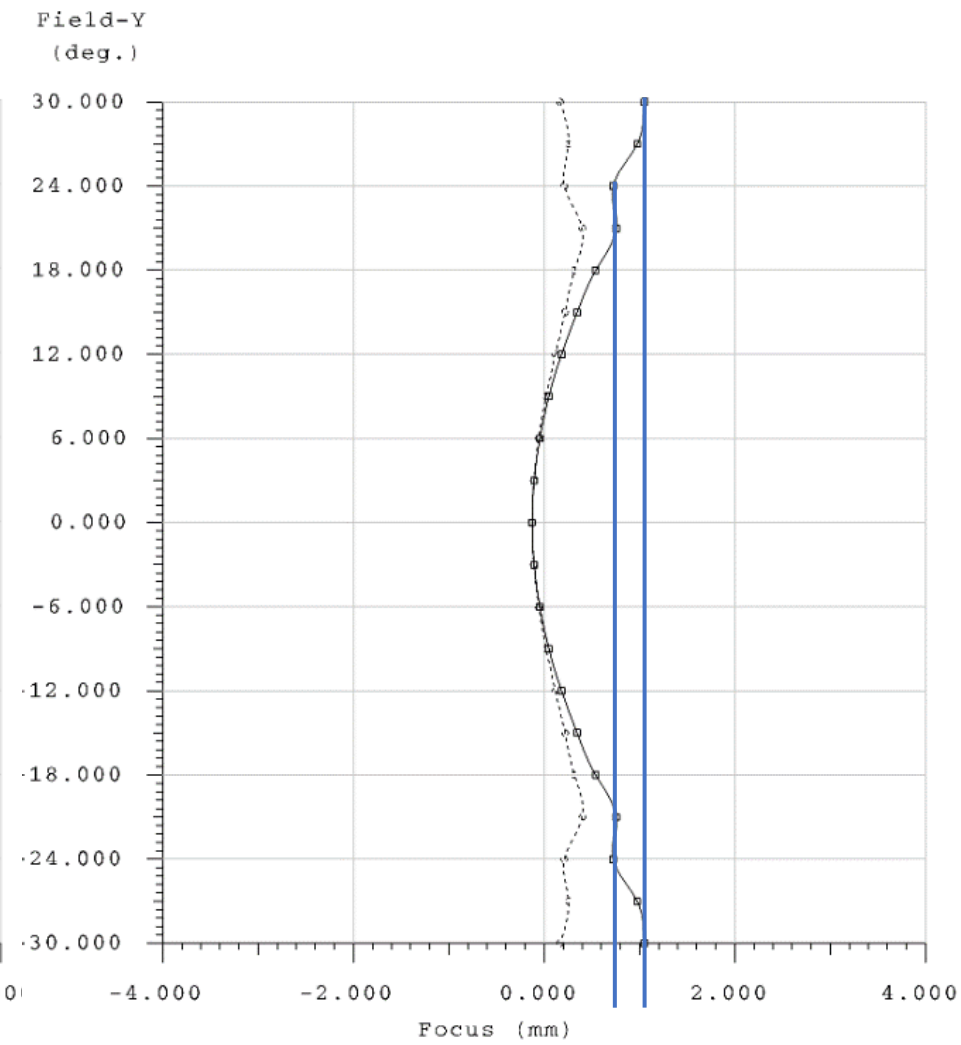




Optik Model PR



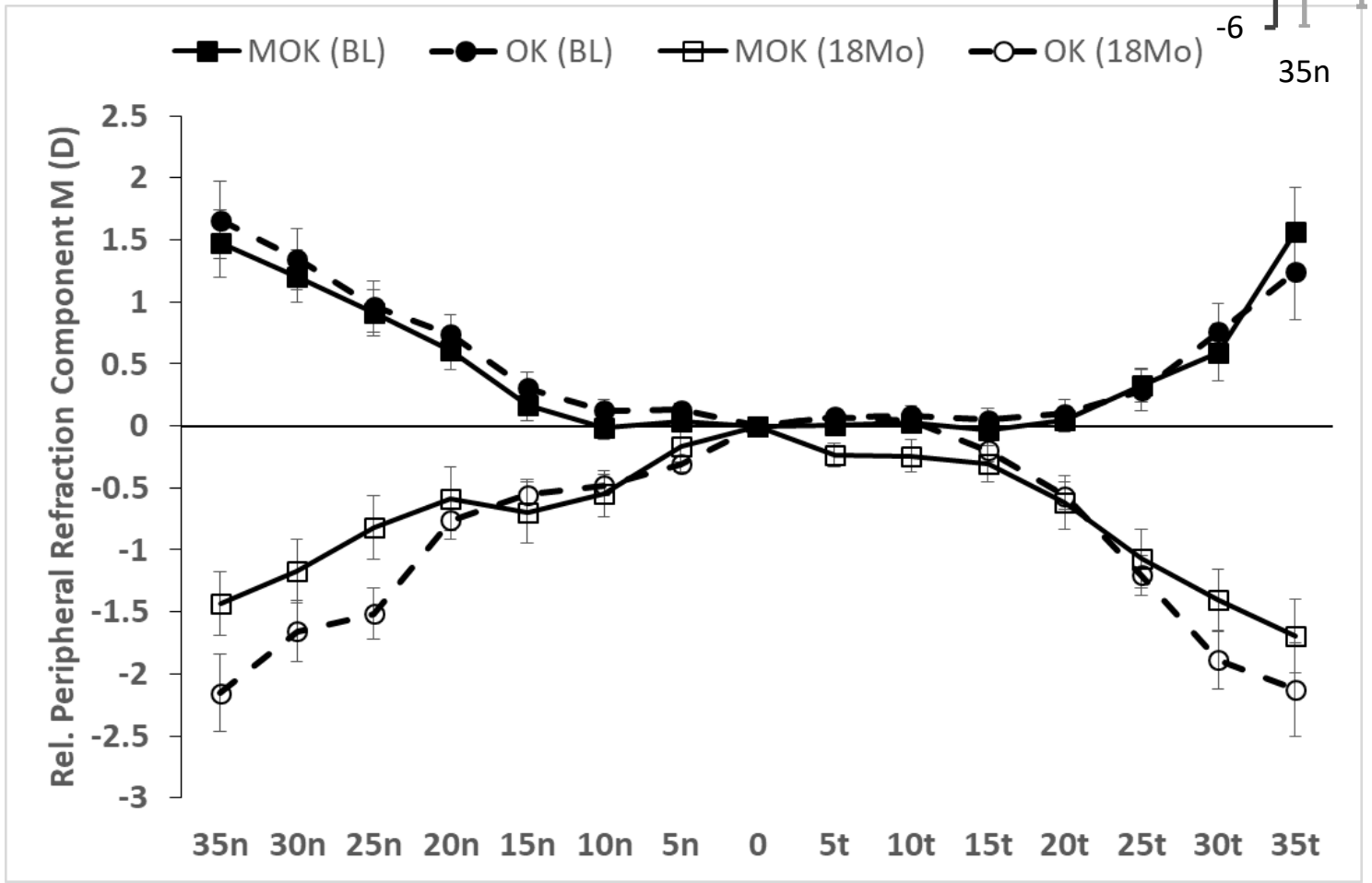
Proclear Sphärisch -2.00 Blick Ferne

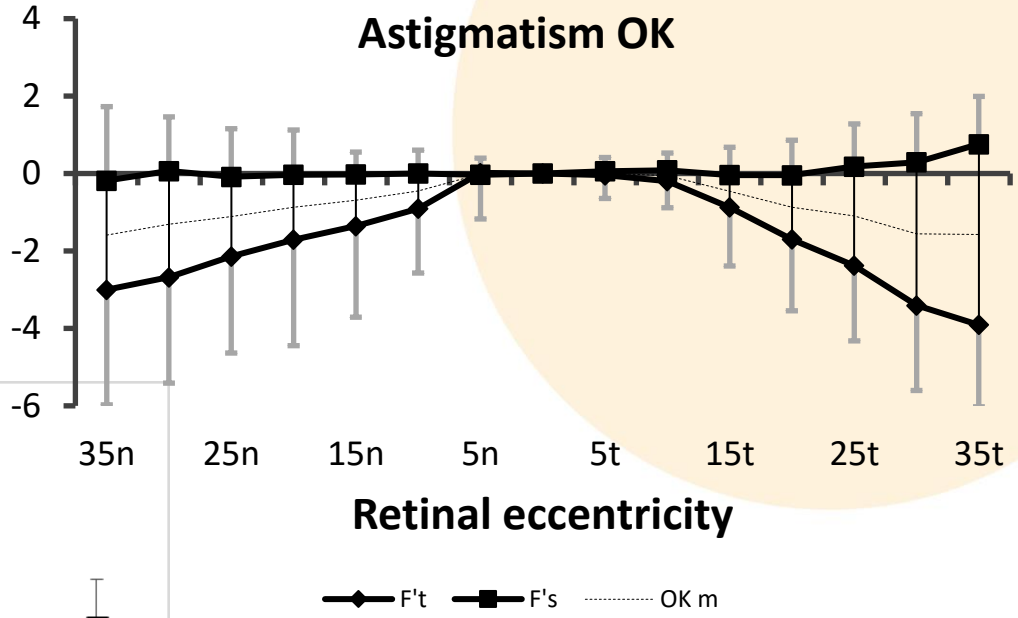


Proclear MF Sphärisch -2.00 Blick Ferne

Peripheral Refraktion

- Multifokale Orthokeratologie (MOK)





Loertscher *J. Clin. Med.* **2021**

Brillengläser

- Momentan eine (2) Publizierte Studie aus Asien (Hong Kong)
  - Defocus Incorporated Multiple Segments (DIMS) spectacle lenses slow myopia progression: a 2- year randomised clinical trial. Lam 2019
- Dieses Project wurde zum Hoya Glas

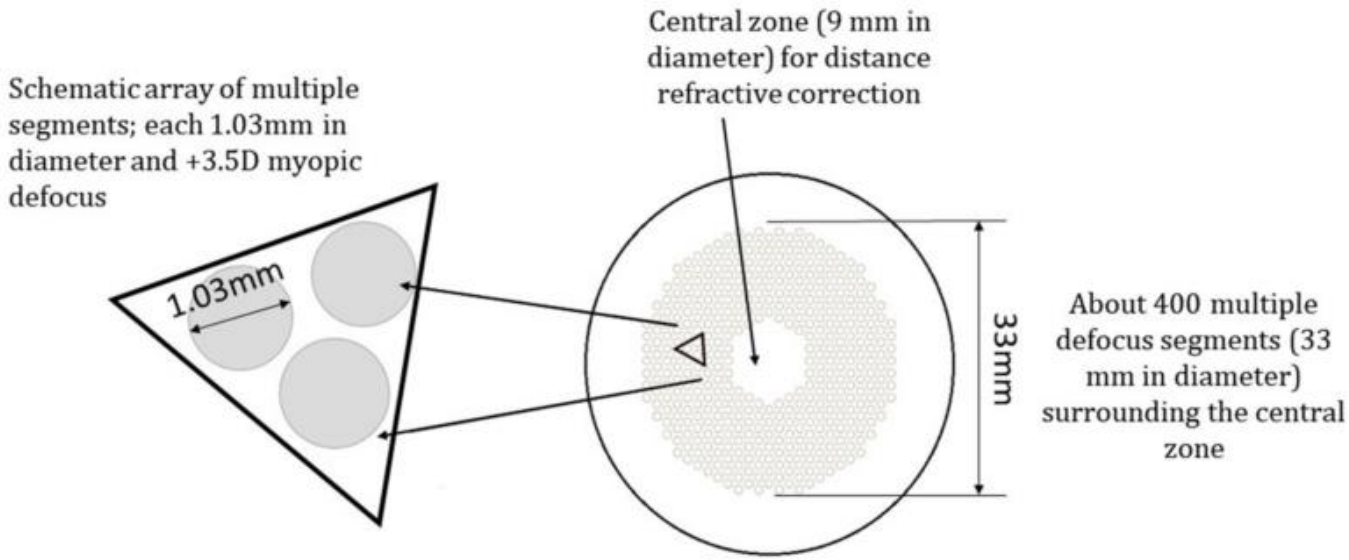


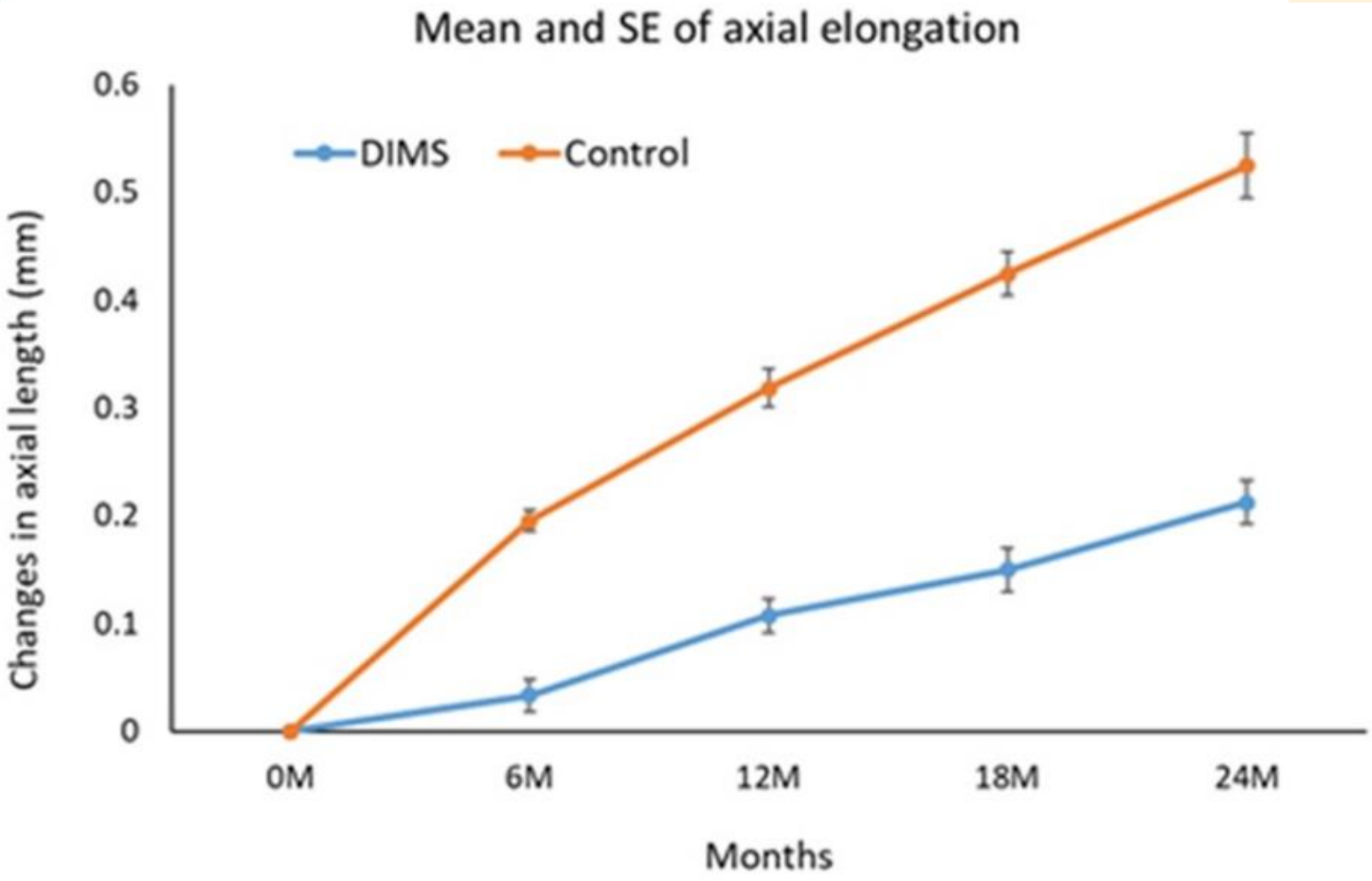
Figure 1 The design of the Defocus Incorporated Multiple Segments (DIMS) spectacle lens.

Teilnehmer

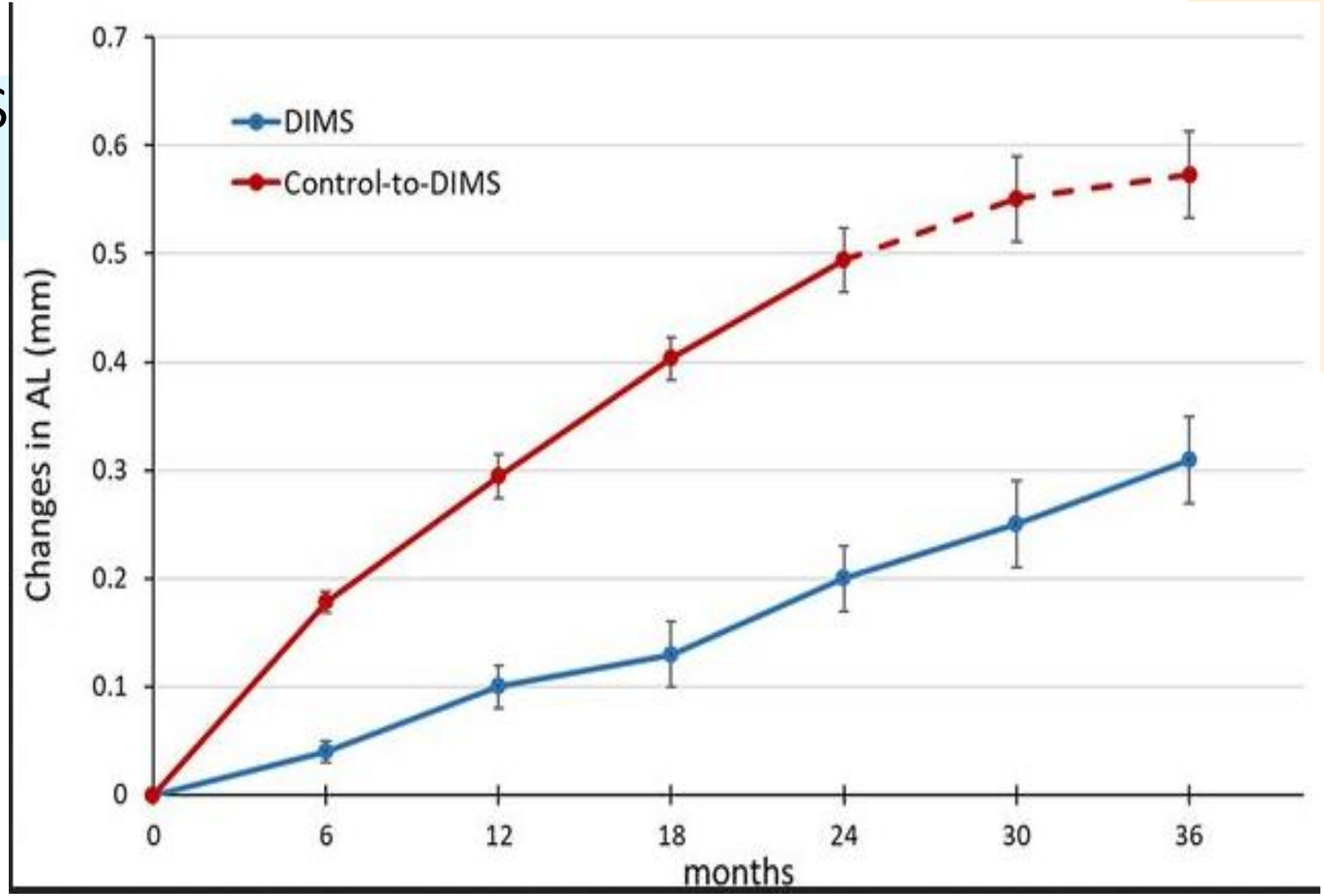
Baseline demographic data, mean (SD)	Mean (SD)			
	All		Completed	
	DIMS (n=93)	SV (n=90)	DIMS (n=79)	SV (n=81)
Age at enrolment (years)	10.19±1.46	10.01±1.44	10.20±1.47	10.00±1.45
Gender				
Male, % (n)	59.1 (55)	55.6 (50)	58.2 (46)	54.3 (44)
Female, % (n)	40.9 (38)	44.4 (40)	41.8 (33)	45.7 (37)
Cycloplegic autorefraction in SER (D)	−2.93±1.04	−2.70±0.98	−2.97±0.97	−2.76±0.96
Axial length (mm)	24.85±1.59	24.72±1.30	24.70±0.82	24.60±0.83
Corneal power at steep meridian (D)	44.46±1.67	44.39±1.69	44.5±1.61	44.5±1.65
Corneal power at flat meridian (D)	43.14±1.41	43.09±1.45	43.2±1.41	43.2±1.44
Near phoria, Δ	−1.96±3.93	−0.98±3.53	−2.16±4.07	−0.15±3.28
Accommodation lag (D)	0.97±0.49	1.06±0.40	0.98±0.42	1.04±0.35
Myopics parents, n				
0	3	6	2	5
1	22	23	18	20
2	68	61	59	56

Δ, prism dioptres; AL, axial length; D, dioptres;DIMS, Defocus Incorporated Multiple Segments spectacle lens; SER, spherical equivalent refraction; SV, single vision spectacle lens.

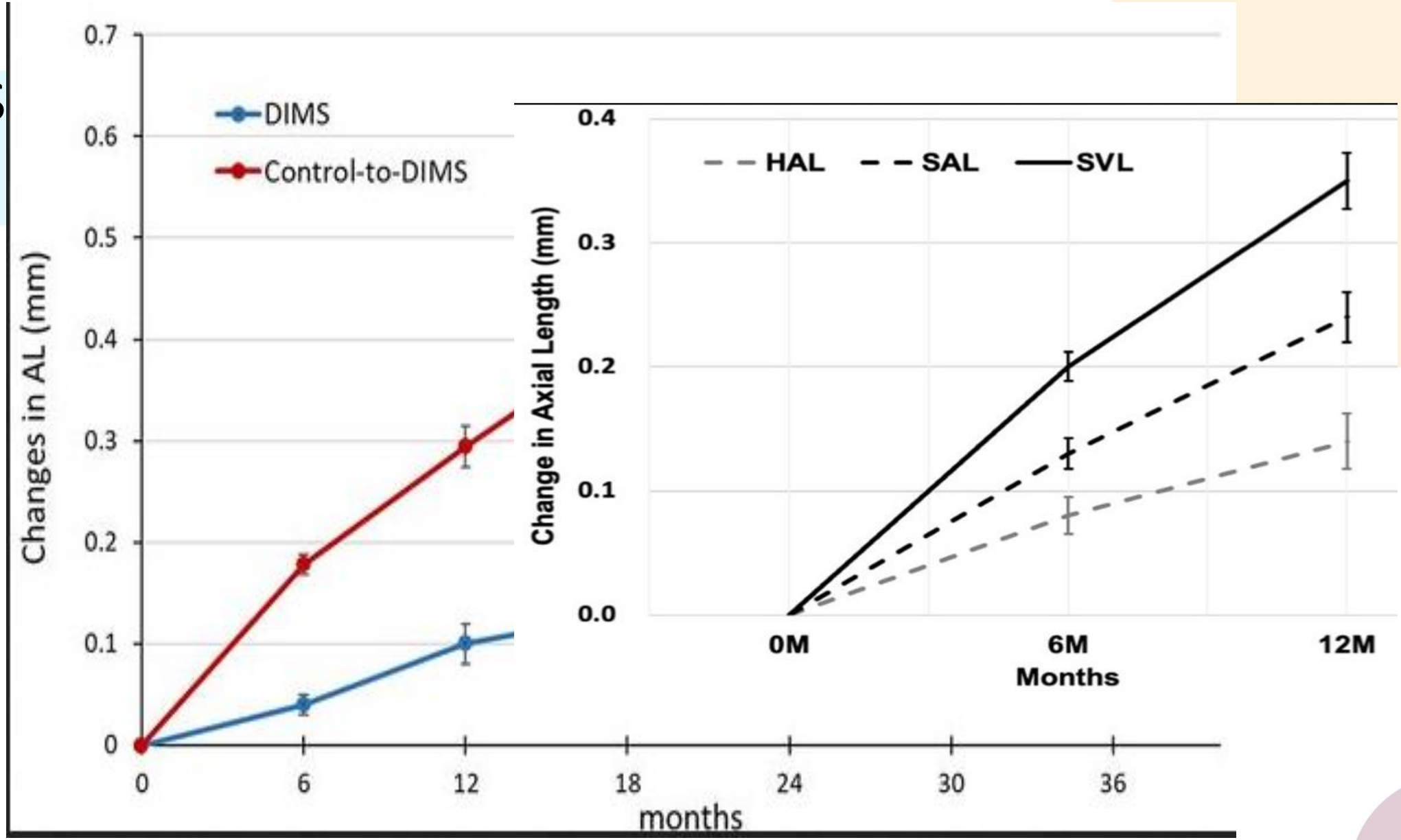
Resultat


Mean and SE of axial elongation
DIMS
Control
Changes in axial length (mm)
0.6
0.5
0.4
0.3
0.2
0.1
0
0M
6M
12M
18M
24M
Months

Res

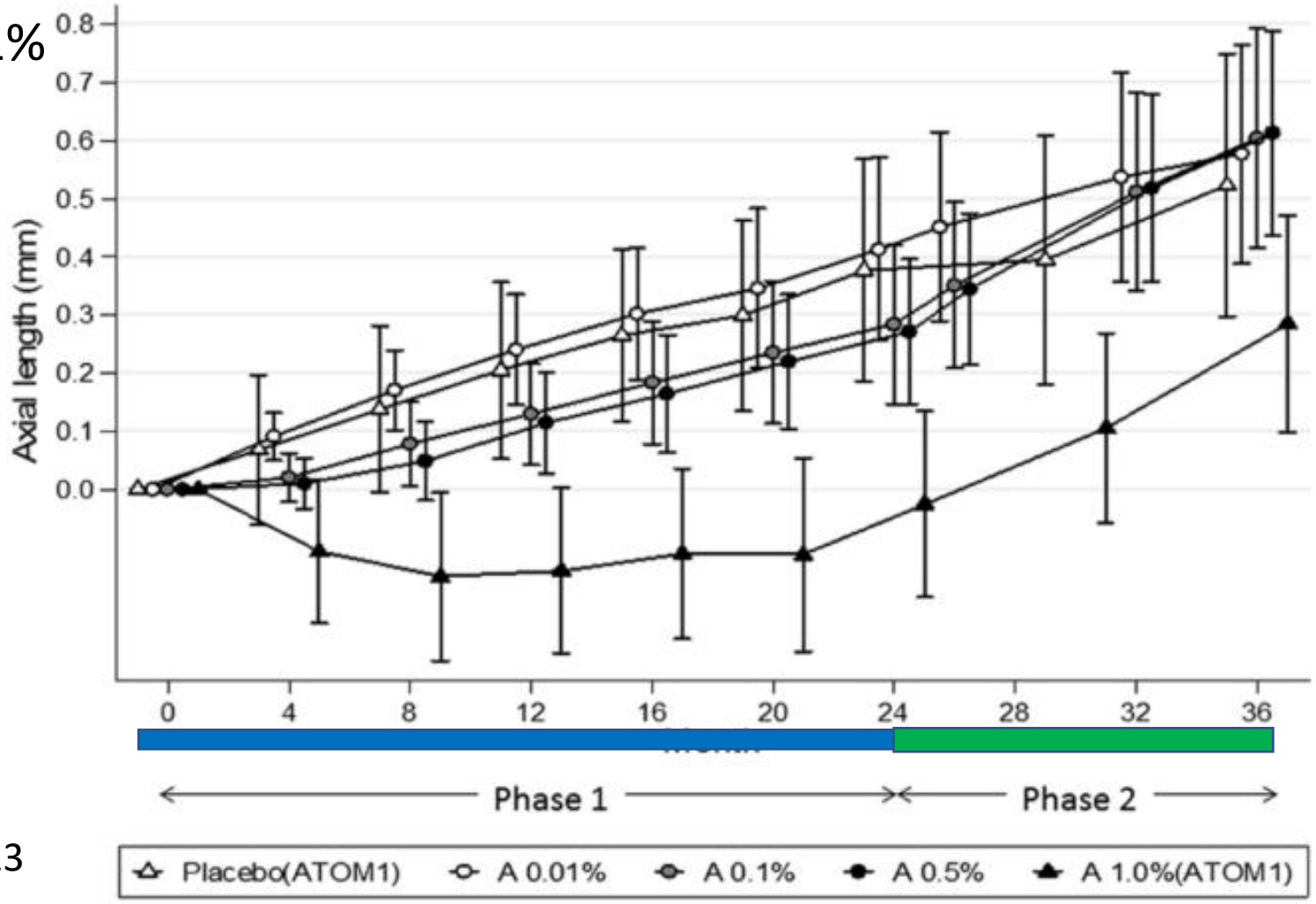

DIMS
Control-to-DIMS
Changes in AL (mm)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
6
12
18
24
30
36
months

Res

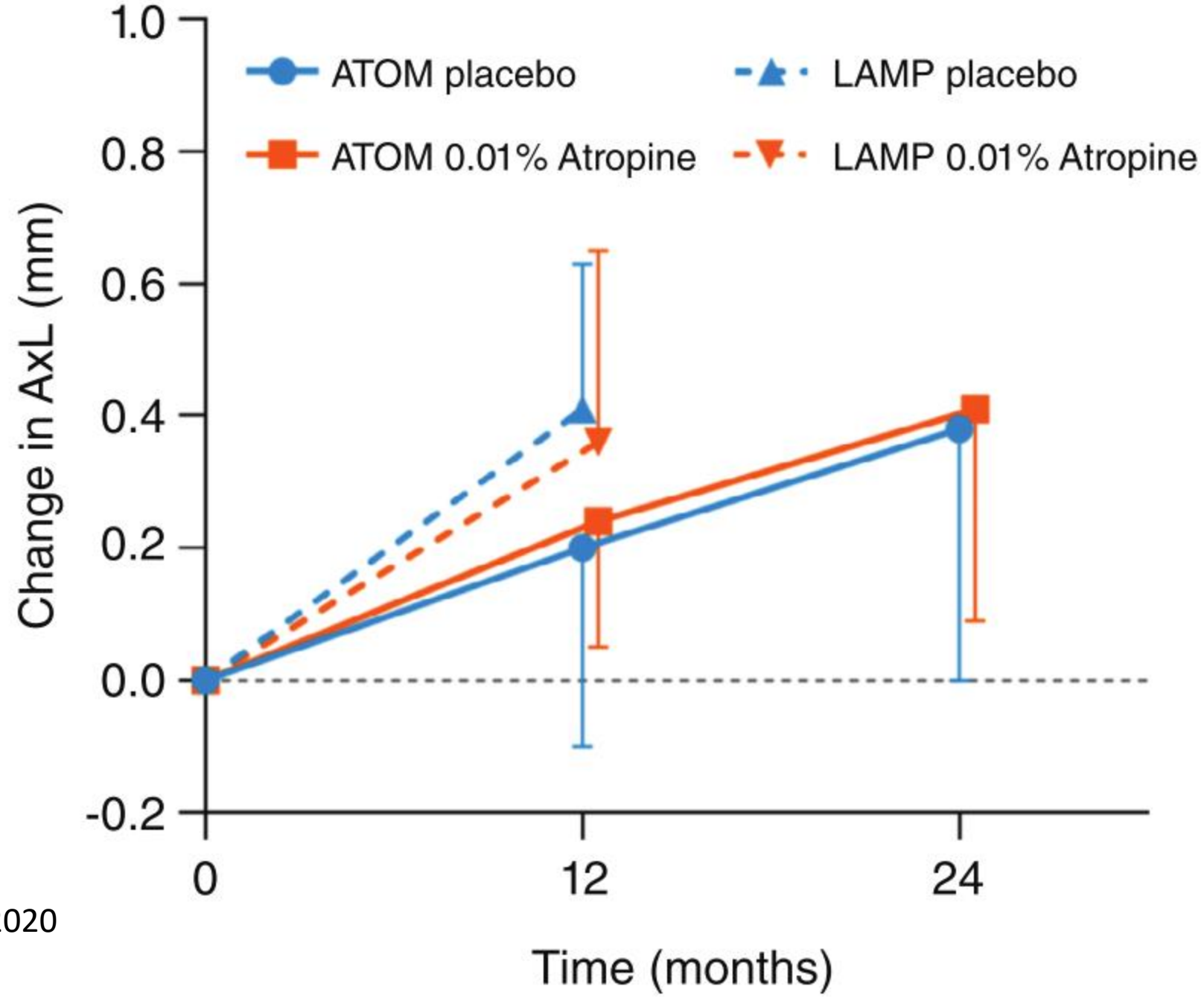

DIMS
Control-to-DIMS
Changes in AL (mm)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
6
12
18
24
30
36
months
HAL
SAL
SVL
Change in Axial Length (mm)
0.4
0.3
0.2
0.1
0.0
0M
6M
12M
Months

Atropin

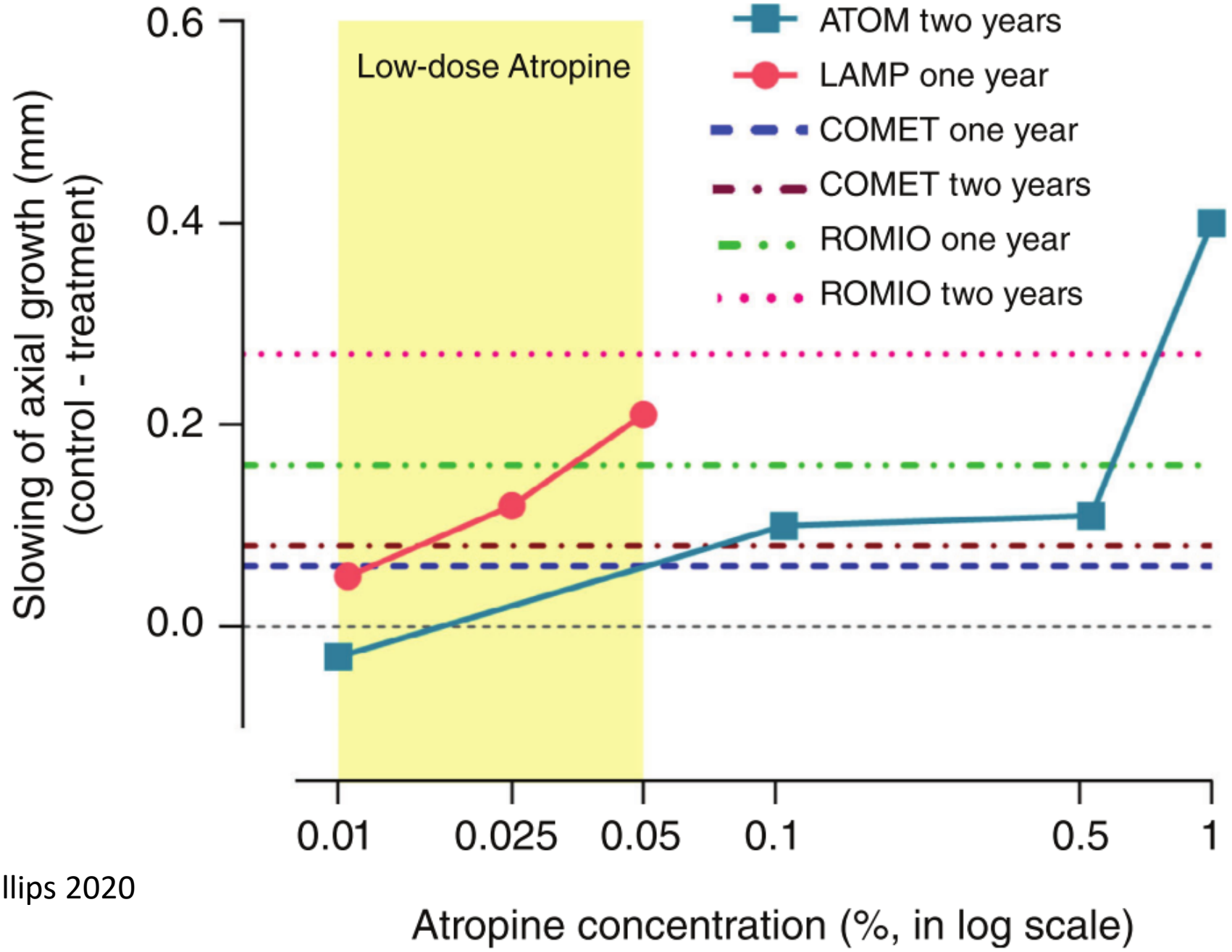
- Wie tief soll die Dosierung sein?
  - Langzeit Favorit (ist) war 0.01%



Chia. 2013



Khanal & Phillips 2020



Khanal & Phillips 2020

Preisverleihung

ORTHOKERATOLOGIE

MySight Kontaktlinse

Atropin

Herzlichen Dank

Pallas Kliniken

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