Augendetektiv®

FORSCHUNG LEHRE ENTWICKLUNG

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Fälle aus der Praxis

Adaptives Myopie-Management

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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Risiko Beurteilung "Anna, 8 Jahre"

	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	both
Age	> 14 years	9 - 14 years	< 9 years
Near work/Day	1 - 2 h	3 - 4 h	> 4 h
Near distance	> 30 cm	> 25 - 29 cm	< 20 - 25 cm
Outdoor time	2 h	1 - < 2 h	< 1 h
Heredity	African 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

⇒ Kind mit hohem Risikoprofil

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Prognose „Anna“

Ethnicity
Caucasian

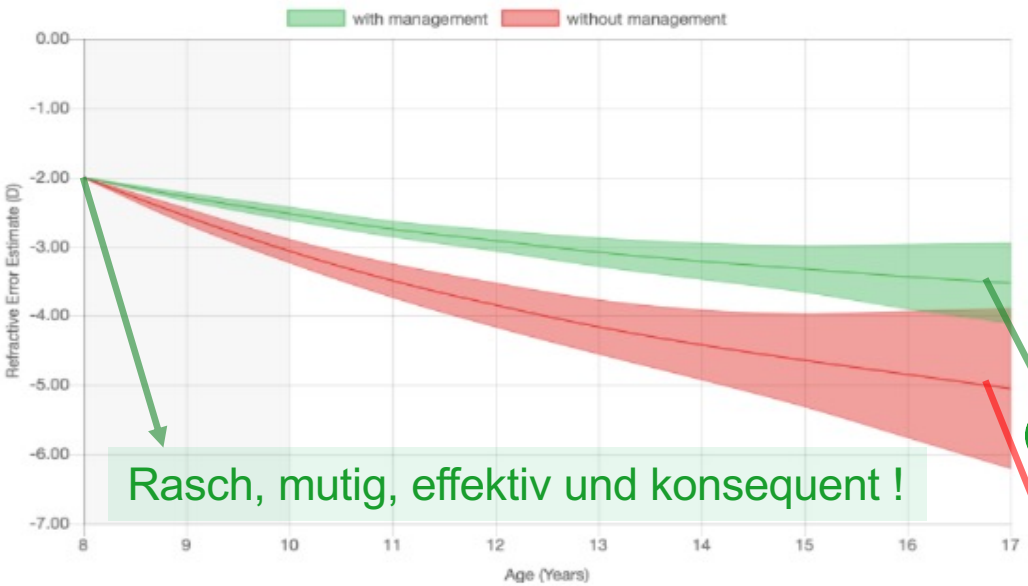
Child's Age (Years)
8

Refractive Error (D)
-2.00

Myopia Management Option
Orthokeratology

Control Rate (%)
30 — 50 — 56

Peer Reviewed
☑



Rasch, mutig, effektiv und konsequent !

Myopia Management Option:

Orthokeratology

Percentage reduction in progression of myopia compared to standard correction e.g. single vision spectacles.

50%

If treated with **Orthokeratology** that provides **50%** control, then the level of myopia at **17** may be:

-3.52D

If myopia control treatment is not commenced immediately, the final level of your child's myopia at **17** may be:

-5.04D

Vorgehen „Anna“ Interaktiv

- Aufklärung:
  - Weniger Stunde lesen < 2 Std täglich
  - Lesedistanz erhöhen > 30cm
  - Vermehrt im Freien spielen 2 Std täglich
- Sehhilfen / Myopie Management:
  - Atropin & SV Gläser -> 0.05% , jung und hohes Risikoprofil
  - Peripher Defokus Gläser -> DIMS / HALT
  - Kontaktlinsen -> Ortho-K, oder weich/hart peripher Defokus KL
- Erste Erfolgskontrolle:
  - Nach 6 bis 12 Mt -> Therapie Erfolg kontrollieren
- Resultat: Rx (besser alters korrelierte Biometrie e.g. Truckenbrod, Tideman, **AMMC**)
  - < 0.25dpt Progression = Tx Ziel erreicht = Tx weiterfahren
  - > 0.50dpt Progression = Tx Ziel verfehlt = **Tx anpassen !**
  - DIMS/HALT oder KL -> zusätz. Low Dose Atropin synergistisch = 0.02% / 0.01%
- Nächste Erfolgskontrolle nach 6 Mt
  - Erfolg = Tx weiterfahren
  - Kein Erfolg = Systemwechsel ! **All-In ! Atropin 0.5%**

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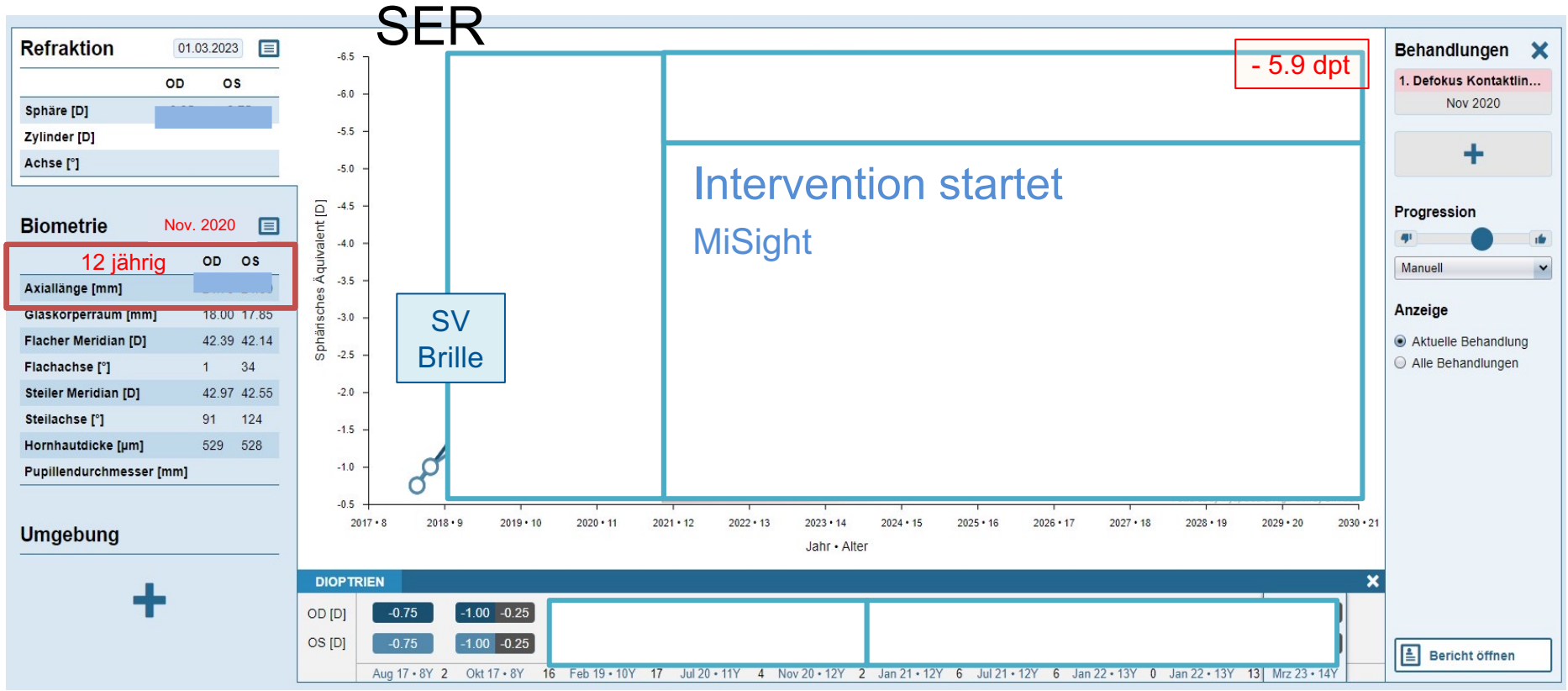
Fallbeispiel “Livia, geb. 2008”

8 Jahre, kaukasisch, beide Eltern myop



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Fallbeispiel “Livia, geb. 2008”

Refraktion

01.03.2023

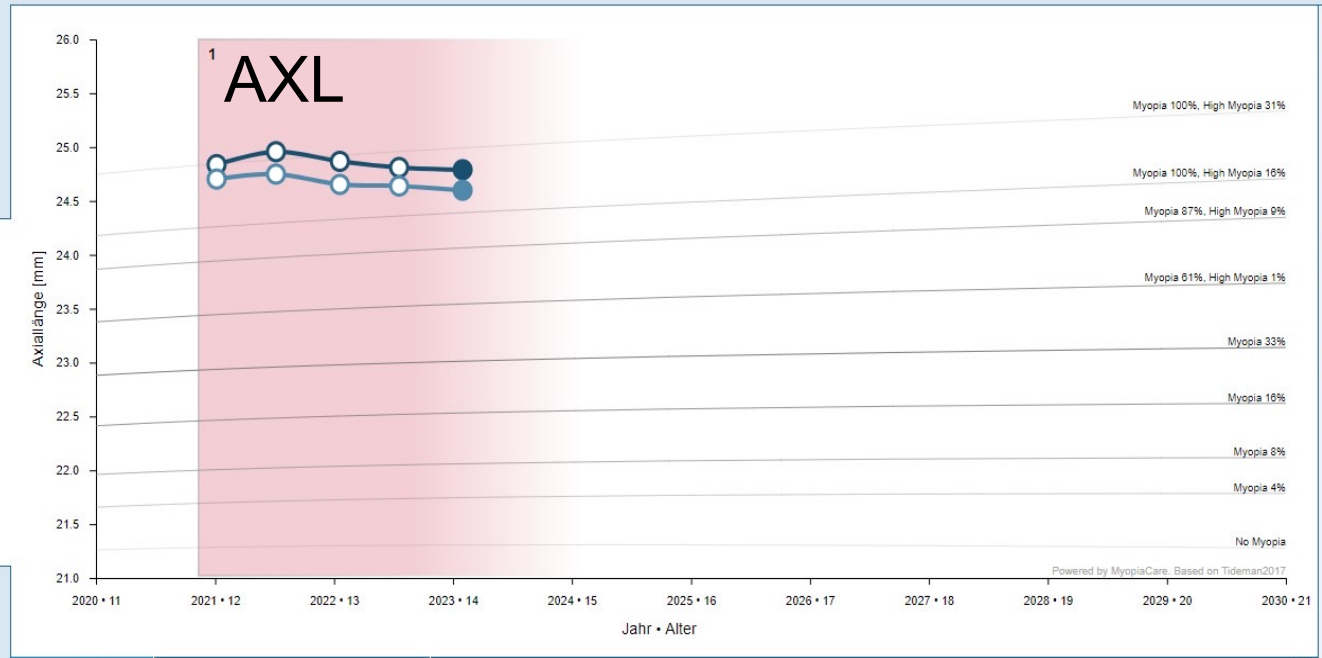
	OD	OS
Sphäre [D]	-3.25	-2.75
Zylinder [D]		
Achse [°]		

Biometrie

30.01.2023

	OD	OS
Axiallänge [mm]	24.79	24.60
Glaskörperraum [mm]	18.00	17.85
Flacher Meridian [D]	42.39	42.14
Flachachse [°]	1	34
Steiler Meridian [D]	42.97	42.55
Steilachse [°]	91	124
Hornhautdicke [µm]	529	528
Pupillendurchmesser [mm]		

Umgebung



	AXIALLÄNGE	MYOPIEWAHRSCHEINLICHKEIT		HOHE MYOPIEWAHRSCHEINLICHKEIT		
OD [mm]	24.84	24.96 +0.12	24.87 -0.09	24.81 -0.06	24.79 -0.02	
OS [mm]	24.70	24.75 +0.05	24.65 -0.10	24.64 -0.01	24.60 -0.04	
	Jan 21 • 12Y 6	Jul 21 • 12Y 6	Jan 22 • 13Y 6	Jul 22 • 13Y 6	Jan 23 • 14Y	

Behandlungen

1. Defokus Kontaktlin...
Nov 2020

Diagramme

- Axiallänge
- Hornhautdicke
- Pupillendurchmesser

Referenzlinien

- Tideman
- Meta-analysis

Bericht öffnen

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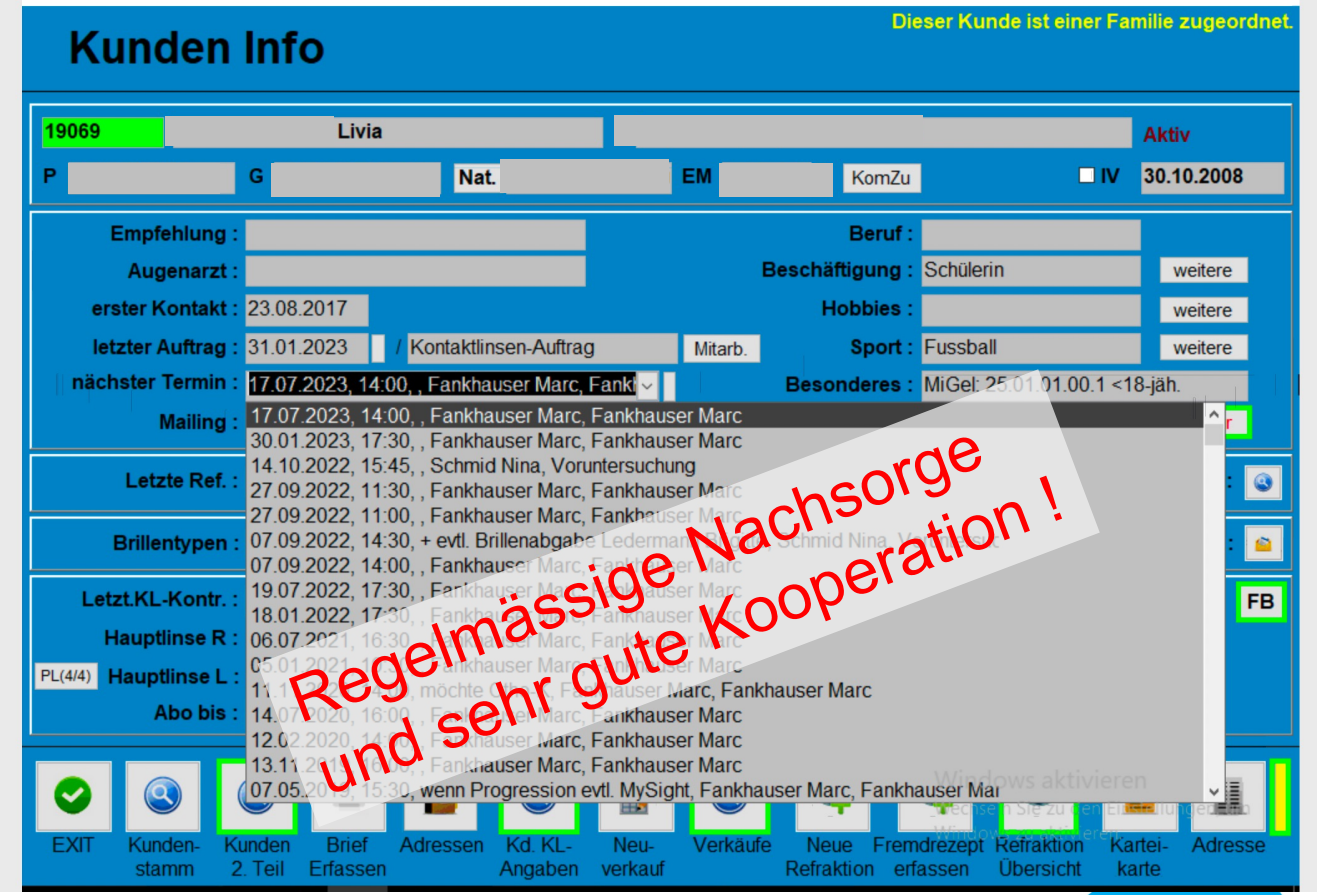
Fallbeispiel “Livia, geb. 2008”



Regelmässige Nachsorge
und sehr gute Kooperation !

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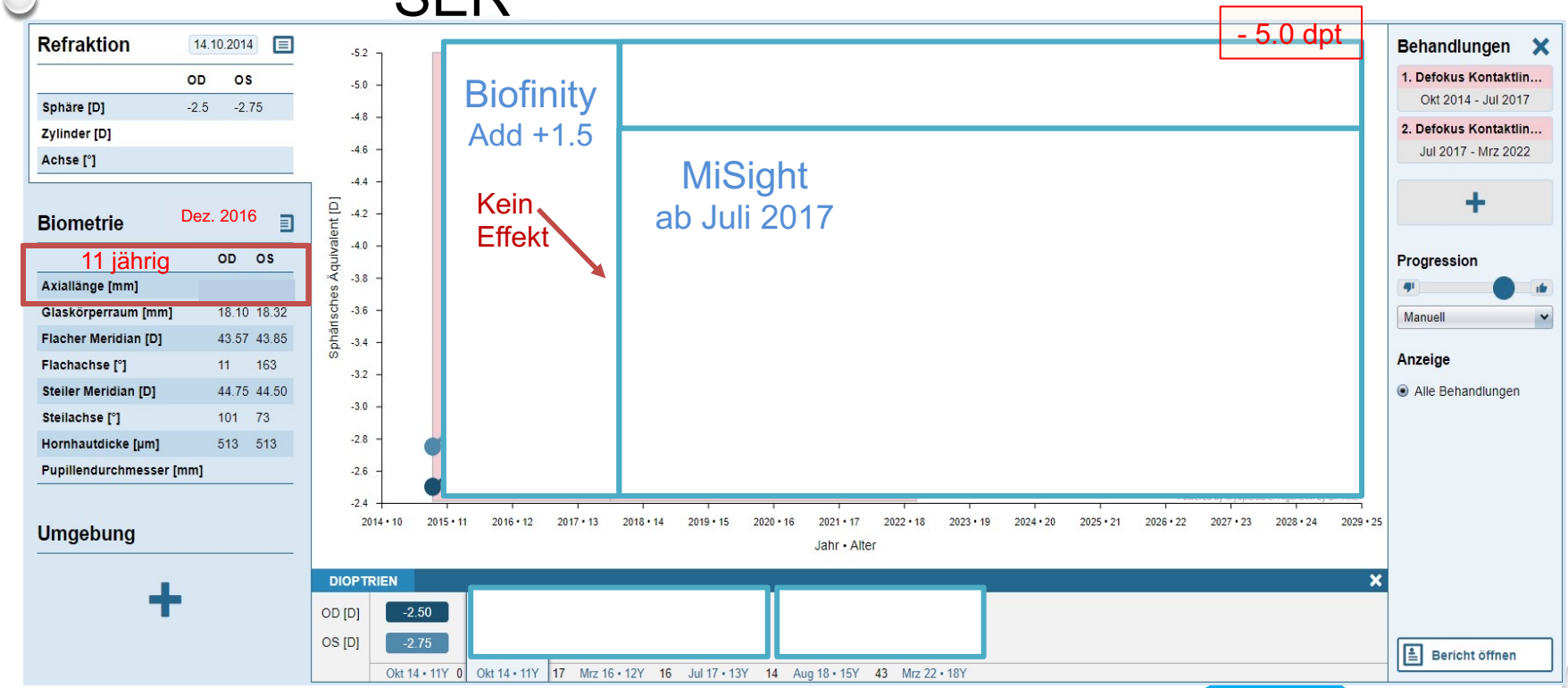
Fallbeispiel “Oliver, geb. 2003”

11 Jahre, kaukasisch, Mutter myop

SER



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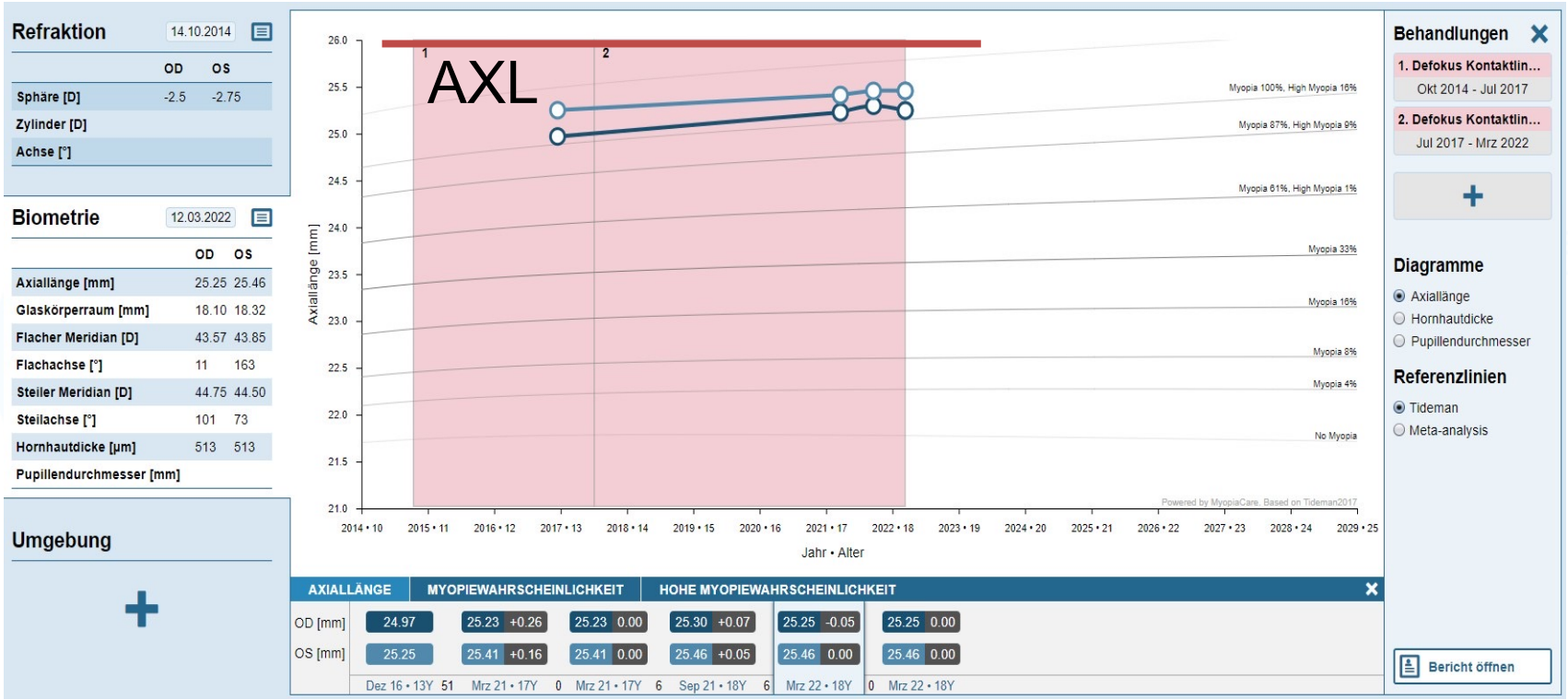
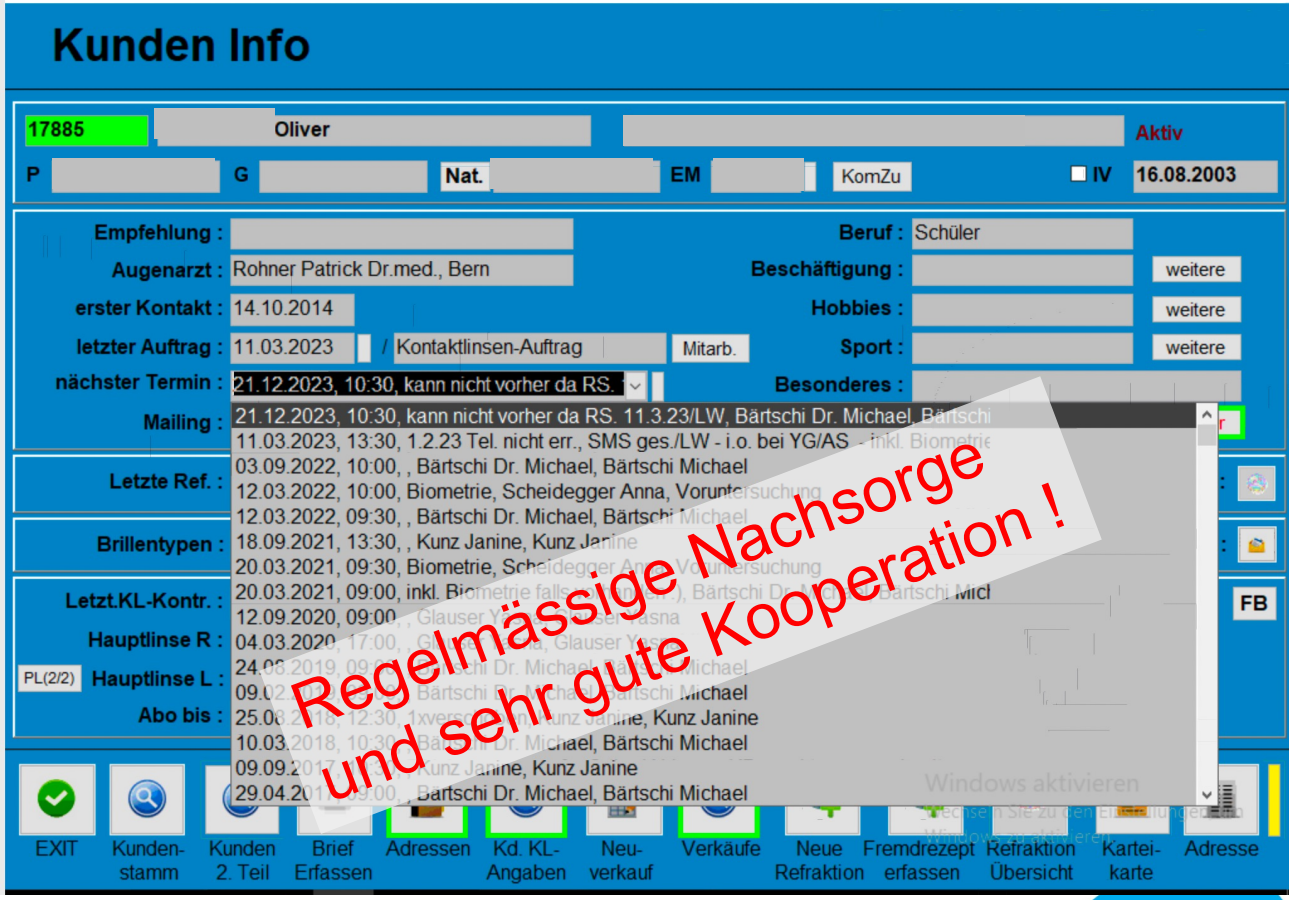
Fallbeispiel “Oliver, geb. 2003”



Fallbeispiel “Oliver, geb. 2003”



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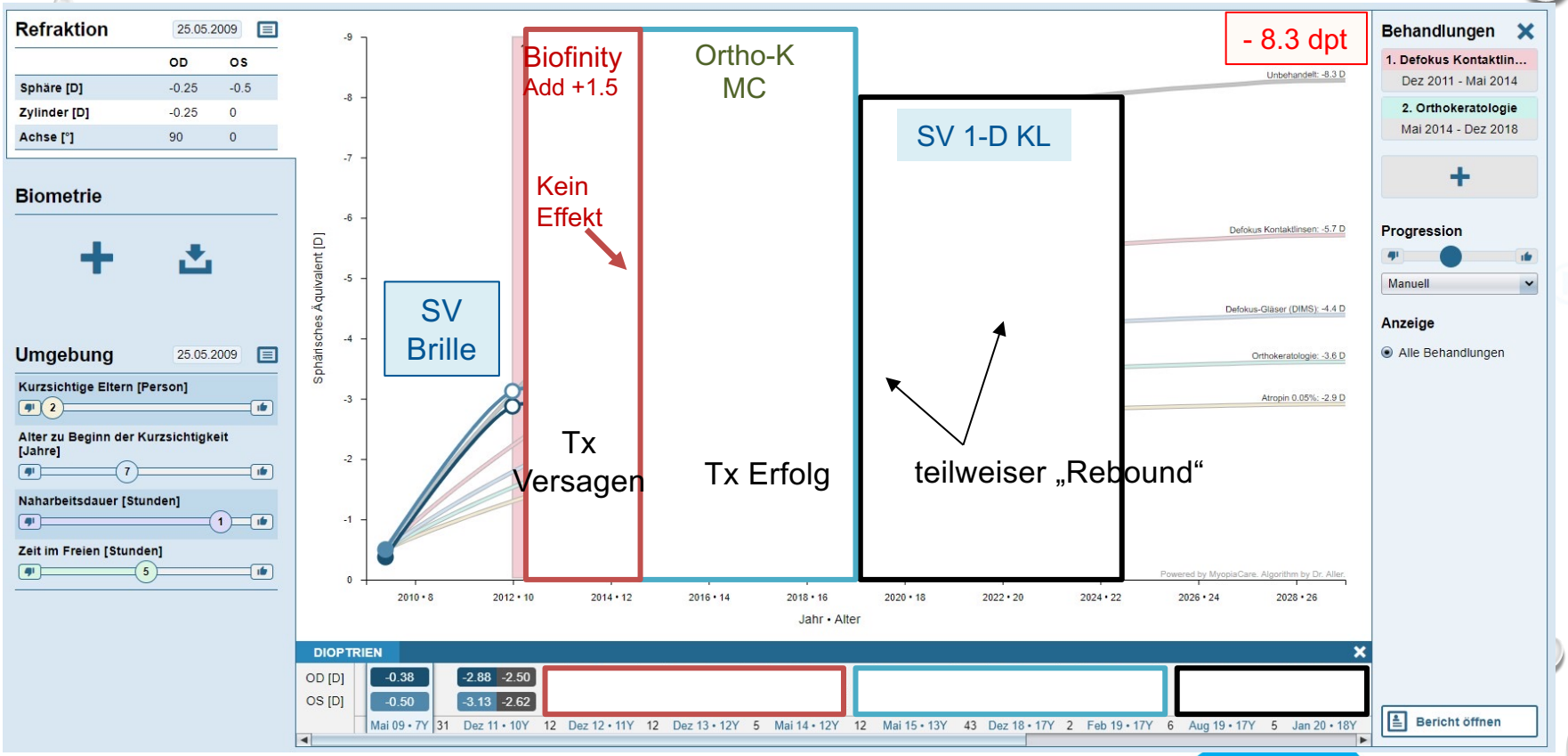
Fallbeispiel “Luana, geb. 2001”

8 Jahre, kaukasisch, beide Eltern myop



Refraktive Entwicklung

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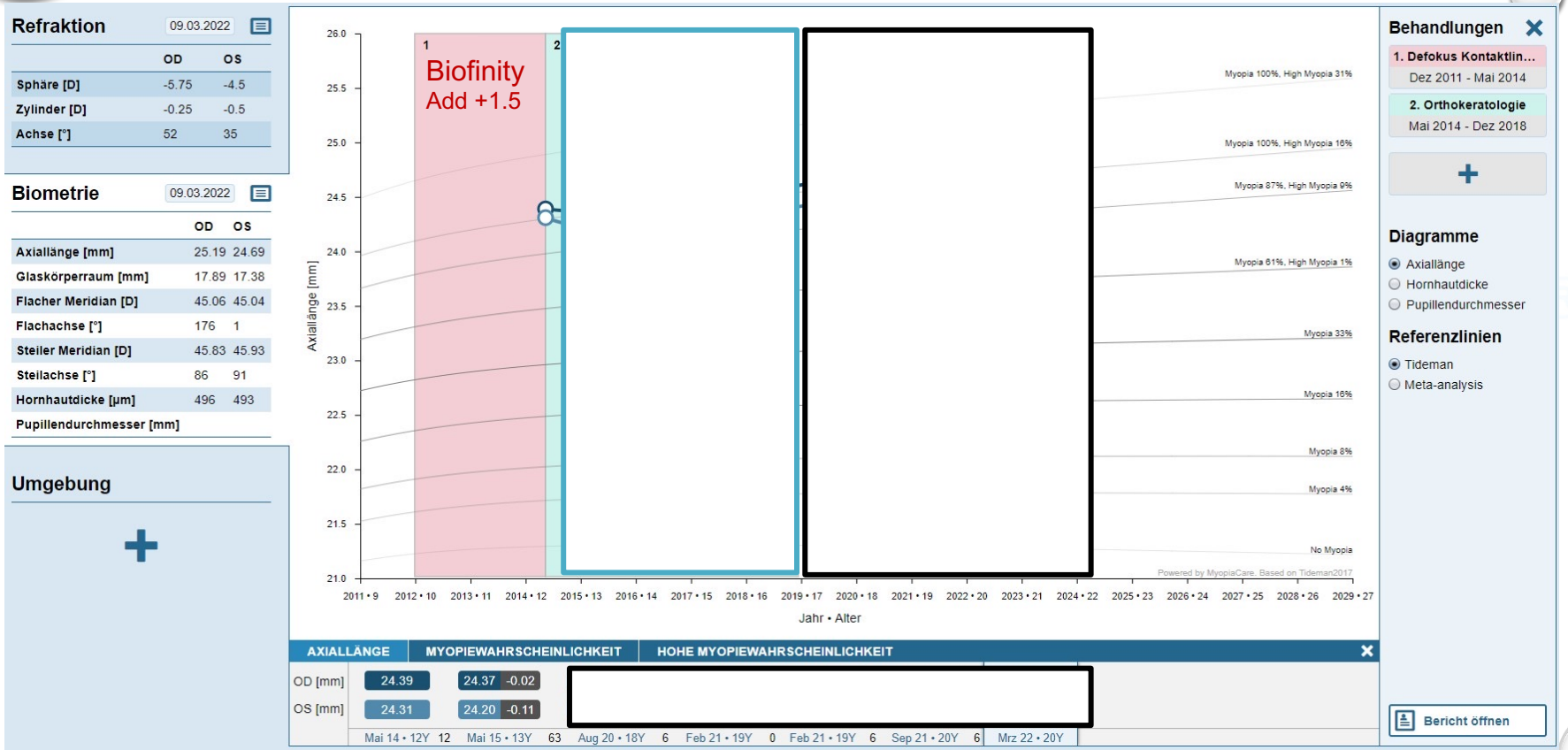
Fallbeispiel “Luana, geb. 2001”



Entwicklung axiale Länge

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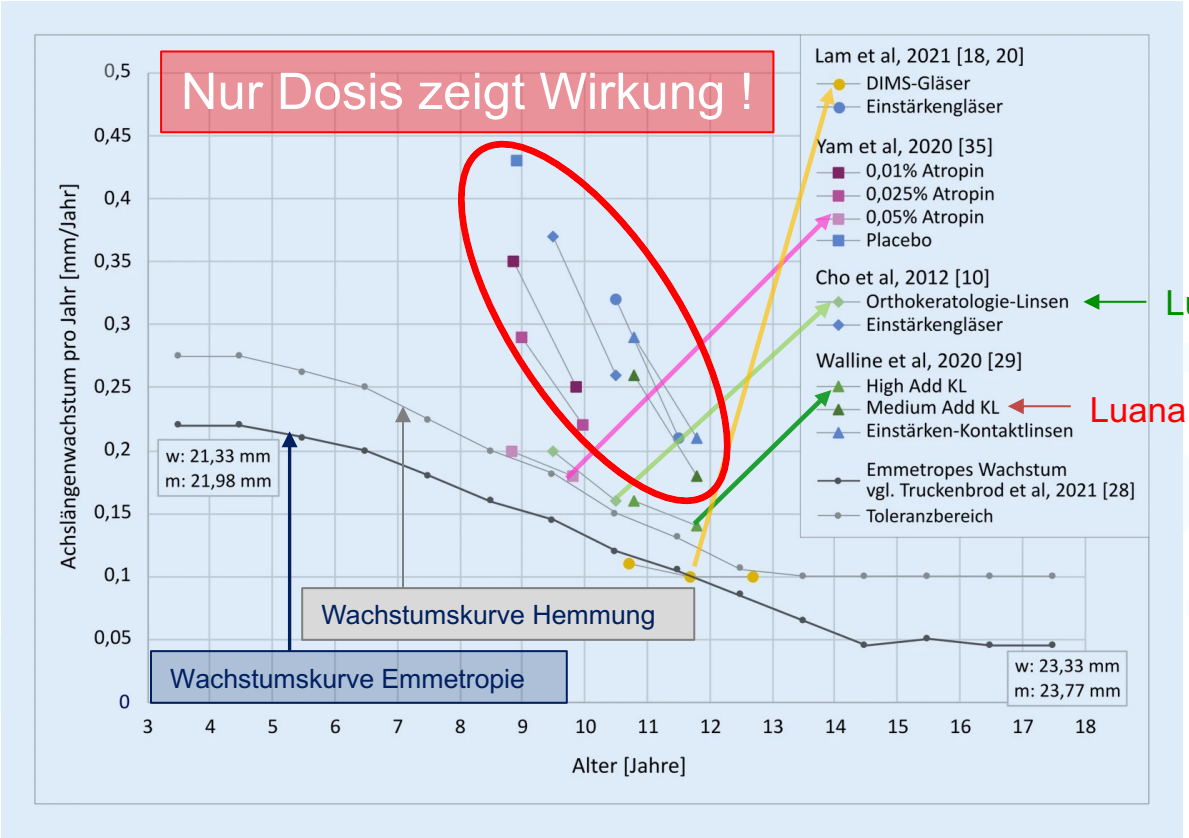
Therapie Erfolg



Carolin Truckenbrod
MScOphthalmology

Das diagnostische und therapeutische Prinzip

Ophthalmologe
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Myopietherapie und Prophylaxe mit „Defocus Incorporated Multiple Segments"-Brillengläsern

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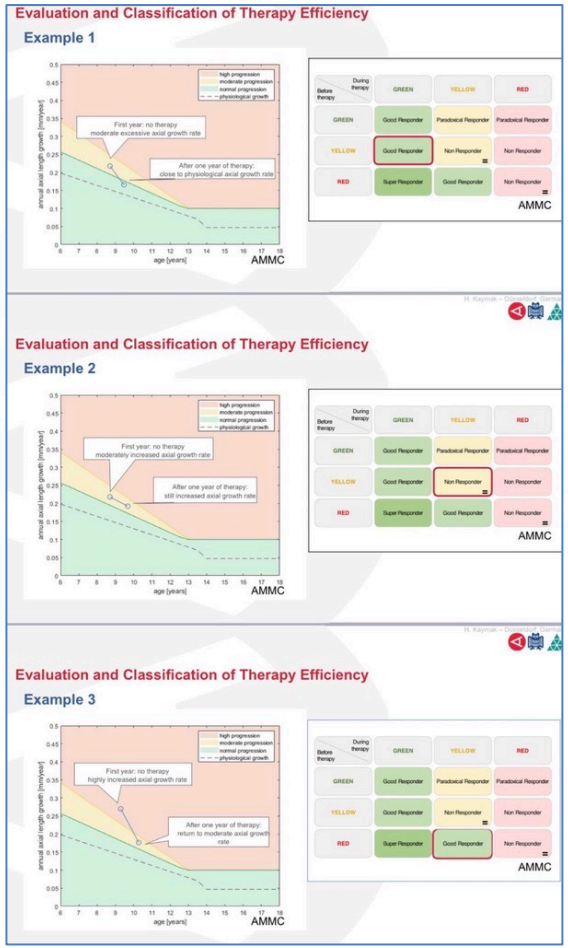
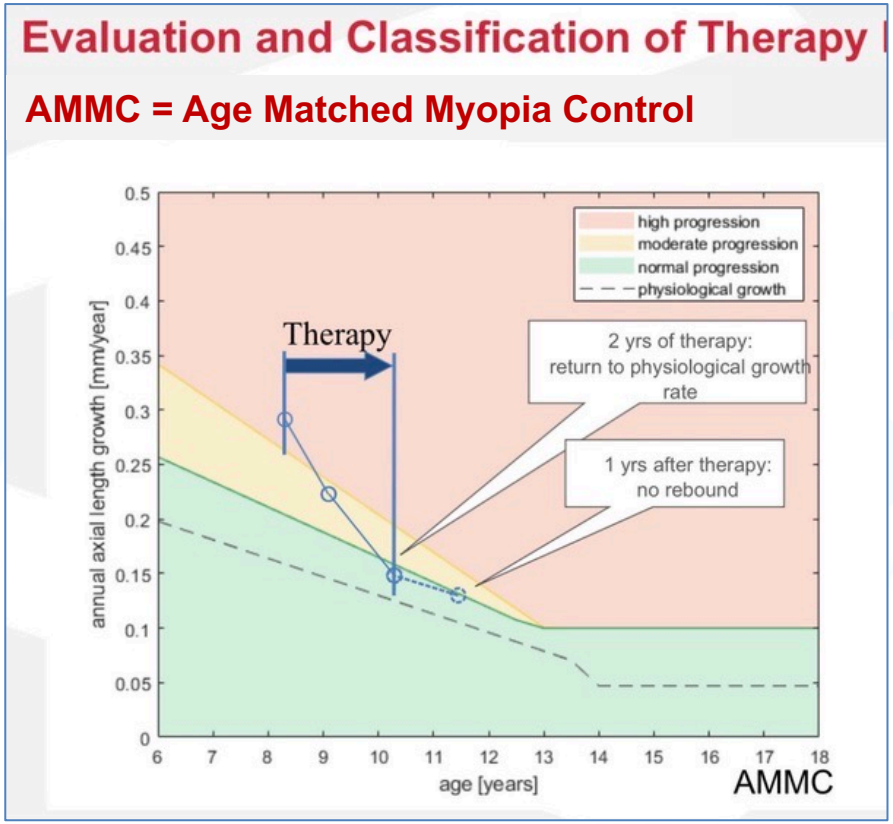
Therapie Erfolg visualisieren AMMC





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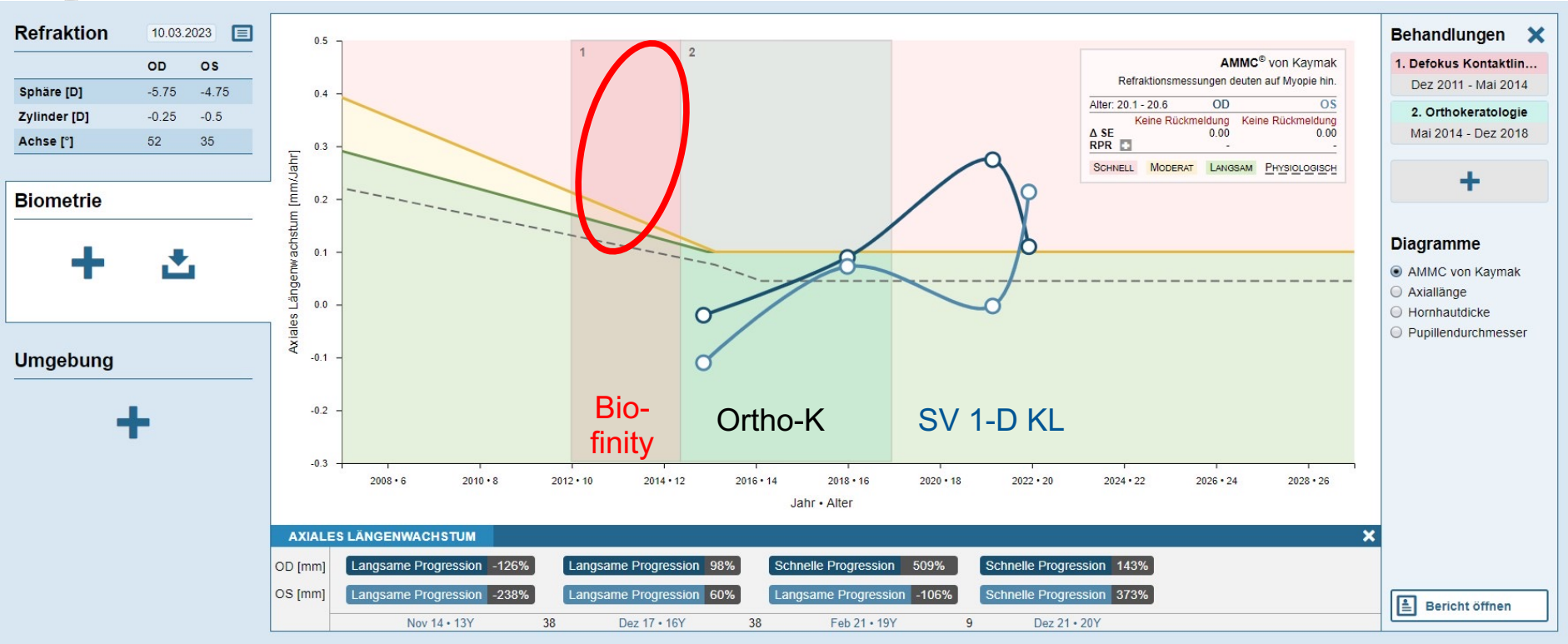
Therapie Erfolg visualisieren

“Luana, geb. 2001”



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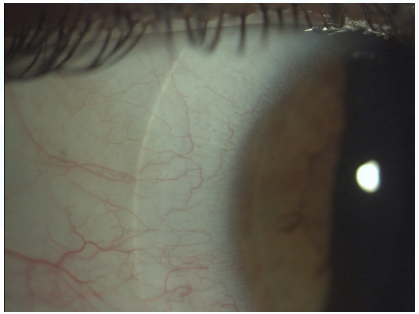
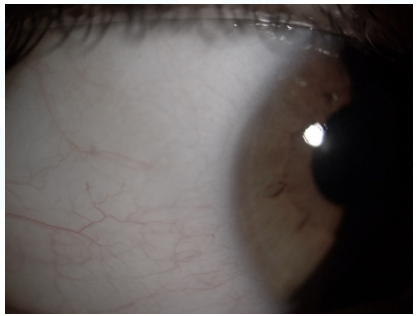
Lehren aus “Luana, 2001”

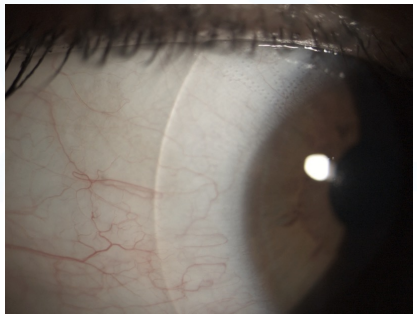
- ✓ Myopie in dpt konnte gehemmt werden (von -3 auf -5/-6 statt -8.5dpt = ca. 50%)
- ✓ Axiale Länge konnte im Bereich „niedriges Risiko“ gehalten werden (25.2/24.7mm)
- ✓ Keine „Adverse Events“ mit KL bisher (2012 – 2023)
- \- Zu geringe Dosierung (Add.+1.5) führte zu Tx Versagen im 2. Jahr
- \- Zu früher Tx Stop führte zu einem teilweisen Rebound



2012
1. Tag (Bio Multi)



2016
Ortho-K (FOKMC)



2021-23
1-Day (Oasys, aktuell)

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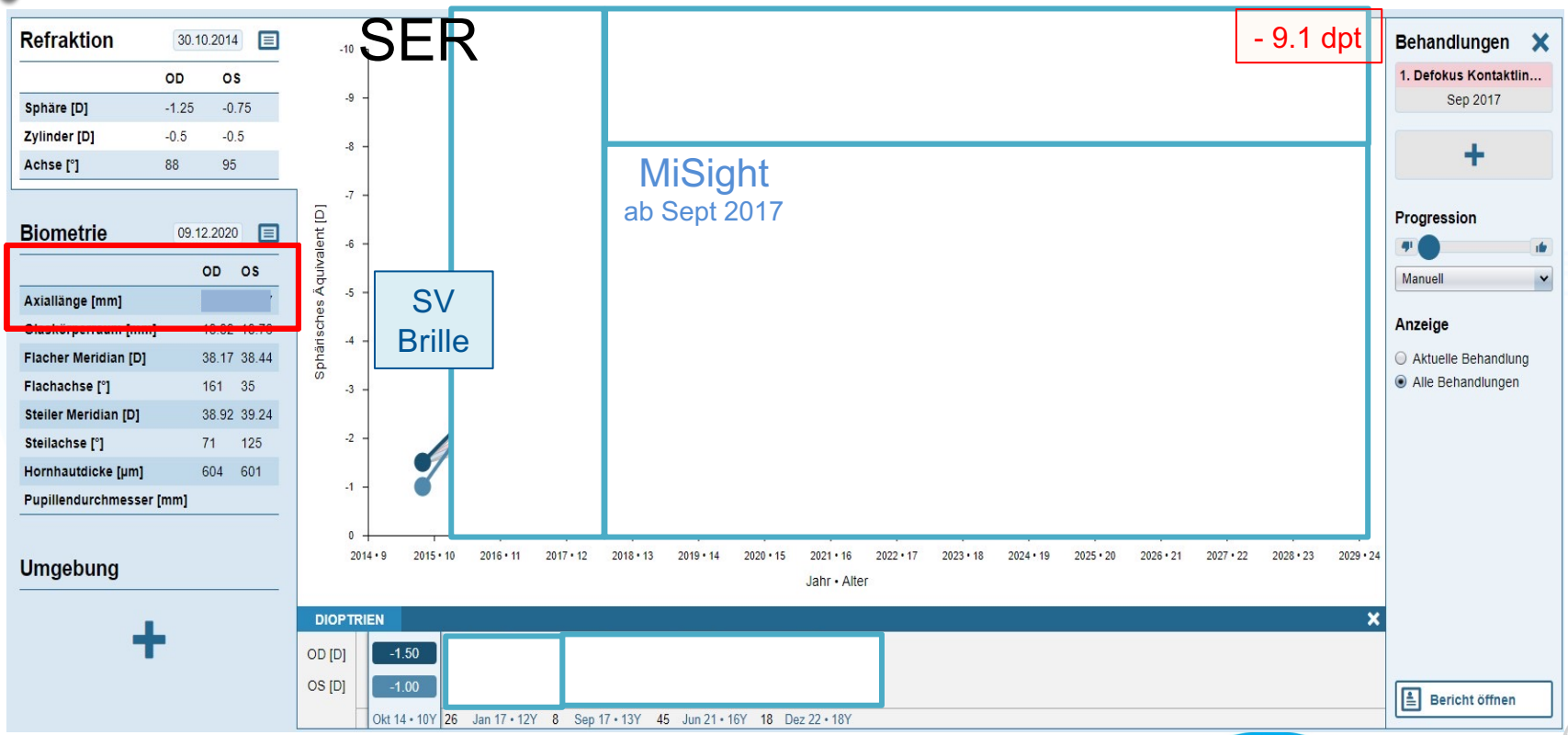
Fallbeispiel “Naomi, geb. 2004”

10 Jahre, asiatisch, beide Eltern myop



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Fallbeispiel “Naomi, geb. 2004”

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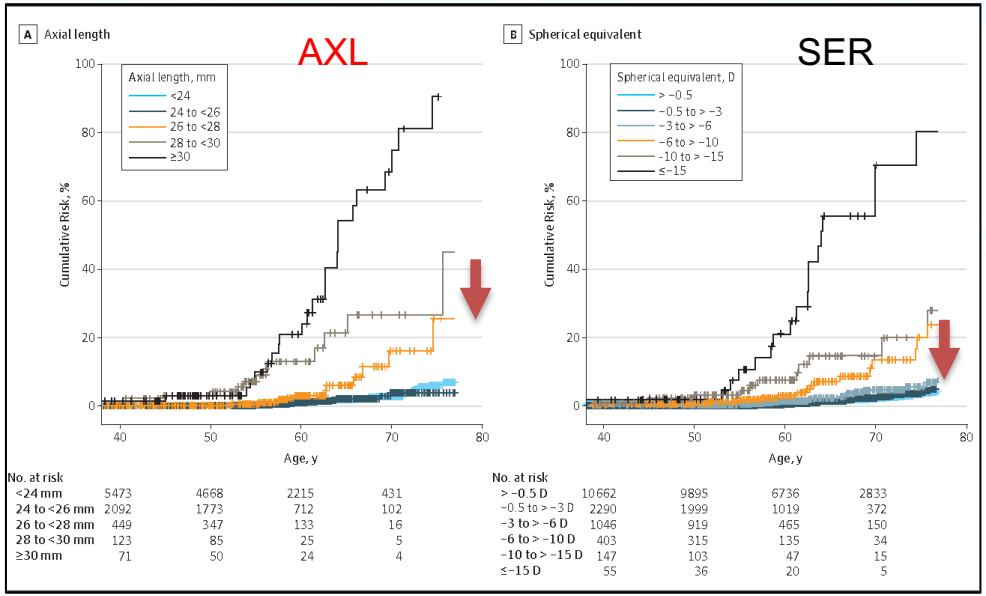
Fallbeispiel “Naomi, geb. 2004”

Die **kontrollierte** Anwendung **präventiver** Maßnahmen, zur **nachhaltigen Hemmung** des **Längenwachstums** des Auges, zwecks **Minimierung** krankhafter **Folgeschäden.**



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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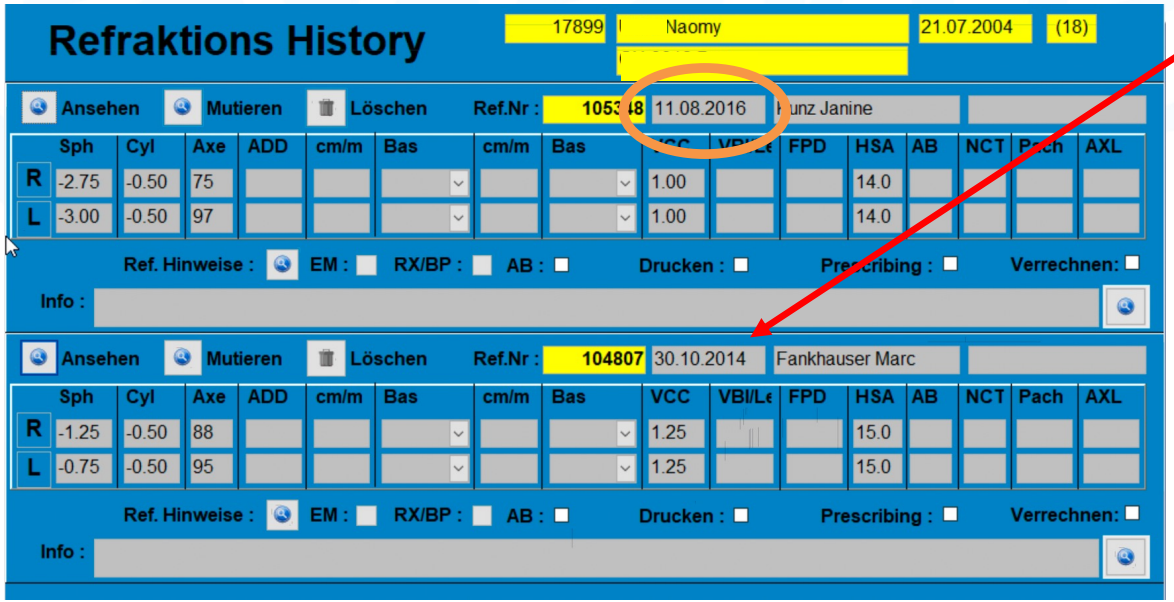
Lehren aus “Naomi, 2004”

- ✓ Myopie in dpt konnte gebremst werden (von -1 auf -4 statt progn. -9.1dpt = ca. 55%)
- ✓ Axiale Länge konnte auf hohem Level gestoppt werden (26.2/26.1mm)
- ✓ Keine „Adverse Events“ mit KL bisher (2017-23)

- Verzögerter Therapiebeginn (2017 statt 2015/16), mit unnötiger Myopie Progression von -2.5 und -3.5dpt innert 2 ½ Jahren



Refraktions History 17899 Naomy 21.07.2004 (18)

Ansehen Mutieren Löschen Ref.Nr : 105348 11.08.2016 unz Janine

	Sph	Cyl	Axe	ADD	cm/m	Bas	cm/m	Bas	VCC	VBI/Le	FPD	HSA	AB	NCT	Pach	AXL
R	-2.75	-0.50	75						1.00			14.0				
L	-3.00	-0.50	97						1.00			14.0				

Ref. Hinweise : EM : RX/BP : AB : Drucken : Prescribing : Verrechnen:

Info :

Ansehen Mutieren Löschen Ref.Nr : 104807 30.10.2014 Fankhauser Marc

	Sph	Cyl	Axe	ADD	cm/m	Bas	cm/m	Bas	VCC	VBI/Le	FPD	HSA	AB	NCT	Pach	AXL
R	-1.25	-0.50	88						1.25			15.0				
L	-0.75	-0.50	95						1.25			15.0				

Ref. Hinweise : EM : RX/BP : AB : Drucken : Prescribing : Verrechnen:

Info :

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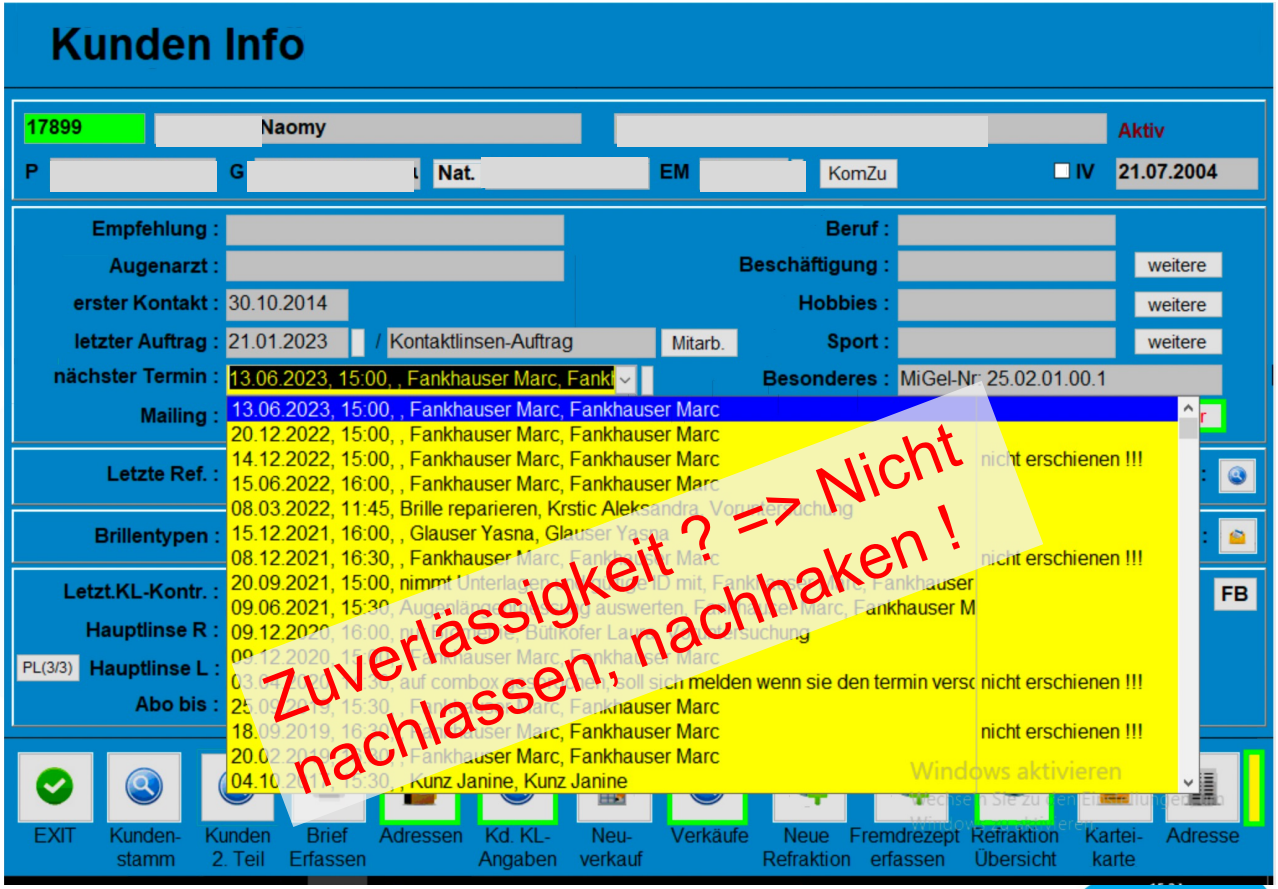
Fallbeispiel “Naomi, geb. 2004”



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Zeitpunkt des Ausstiegs

www.nature.com/scientificreports

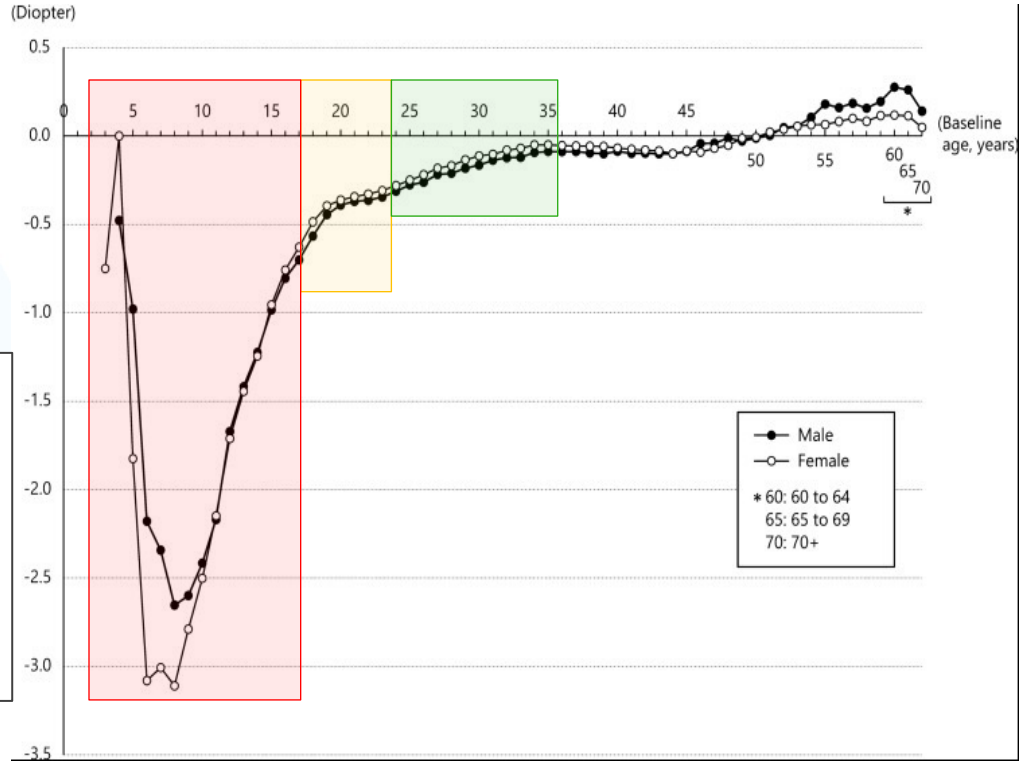
scientific reports

Check for updates

OPEN **Longitudinal analysis of 5-year refractive changes in a large Japanese population**

Masaki Takeuchi[1,2], Akira Meguro[1,2], Masao Yoshida[3], Takahiro Yamane[1,2], Keisuke Yatsu[4,5], Eiichi Okada[6] & Nobuhisa Mizuki[1,2]

Refractive changes are reportedly affected by age, sex, and current refractive error. To clarify the pattern of refractive changes in a Japanese population, we conducted a 5-year follow-up longitudinal analysis of spherical equivalent (SE) refractive changes with stratification by sex, age, and SE in 593,273 eyes from Japanese individuals ages 3–91 years. The 5-year SE change with myopic shift dramatically increased over time after age 4 years, and the largest change was observed in both males and females who were age 8 years at baseline [males: − 2.654 ± 0.048 diopters (D); females: − 3.110 ± 0.038 D]. During school age, the 5-year myopic change was greater in females than in males, and emmetropic and low-to-moderate myopic eyes underwent larger myopic changes than hyperopic and high-to-severe myopic eyes. After the peak at age 8 years, the 5-year myopic change gradually declined with age and fell below − 0.25 D at age 27 in males and age 26 years in females. The 5-year SE changes transitioned from a myopic to a hyperopic shift at age 51 in both sexes, and hyperopization advanced more quickly in hyperopic eyes. Our findings highlight the importance of myopia prevention in school-aged children.



593,273 eyes from Japanese individuals ages 3–91 years. The 5-year SE change with myopic shift dramatically increased over time after age 4 years, and the largest change was observed in both males and females who were age 8 years at baseline [males: − 2.654 ± 0.048 diopters (D); females: − 3.110 ± 0.038 D]. During school age, the 5-year myopic change was greater in females than in males, and emmetropic and low-to-moderate myopic eyes underwent larger myopic changes than hyperopic and high-to-severe myopic eyes. After the peak at age 8 years, the 5-year myopic change gradually declined with age and fell below − 0.25 D at age 27 in males and age 26 years in females. The 5-year SE

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Zeitpunkt des Ausstiegs

OPO OPHTHALMIC & PHYSIOLOGICAL OPTICS
THE JOURNAL OF THE COLLEGE OF OPTOMETRISTS

Ophthalmic and Physiological Optics ISSN 0275-5408

Longitudinal analysis of axial length growth in a German cohort of healthy children and adolescents

Carolin Truckenbrod[1], Christof Meigen[1], Manuela Brandt[1], Mandy Vogel[1], Pablo Sanz Diez[2,3], Siegfried Wahl[2,3], Anne Jurkutat[1] and Wieland Kiess[1,4,5]

[1]Leipzig Research Center for Civilization Diseases (LIFE), Leipzig University, Leipzig, Germany, [2]Institute for Ophthalmic Research, Eberhard Karls University Tuebingen, Tuebingen, Germany, [3]Carl Zeiss Vision International GmbH, Aalen, Germany, [4]Department of Women and Child Health, University Hospital for Children and Adolescents and Center for Pediatric Research, Leipzig University, Leipzig, Germany, and [5]Center for Pediatric Research, Leipzig University, Leipzig, Germany

Citation information: Truckenbrod C, Meigen C, Brandt M, Vogel M, Sanz Diez P, Wahl S, Jurkutat A, & Kiess W. Longitudinal analysis of axial length growth in a German cohort of healthy children and adolescents. *Ophthalmic Physiol Opt* 2021; 41: 532–540. https://doi.org/10.1111/opo.12817

Table 2. 2nd, 25th, 50th, 75th and 98th centiles of axial length of children aged 6, 9, 12 and 15 years in China and Europe

		Female			Male		
	Percentile	LIFE Child Germany	Tideman *et al.*[9] Europe	Sanz Diez *et al.*[8] China	LIFE Child Germany	Tideman *et al.*[9] Europe	Sanz Diez *et al.*[8] China
6 years	2	20.76	–	20.97	21.08	–	21.44
	25	21.6	21.66	22.03	22.13	22.14	22.55
	50	22.00	22.06	22.54	22.61	22.59	22.99
	75	22.39	22.49	23.04	23.08	23.01	23.50
	98	23.16	–	24.07	24.00	–	25.00
9 years	2	21.21	–	21.86	21.53	–	22.21
	25	22.14	22.33	23.16	22.59	22.83	23.70
	50	22.59	22.79	23.72	23.10	23.31	24.32
	75	23.04	23.25	24.31	23.61	23.79	24.89
	98	23.97	–	25.55	24.65	–	25.96
12 years	2	21.48	–	22.24	21.83	–	22.86
	25	22.48	–	23.57	22.90	–	24.21
	50	22.99	–	24.16	23.44	–	24.83
	75	23.51	–	24.76	24.00	–	25.44
	98	24.64	–	26.13	25.17	–	26.70
15 years	2	21.57	–	22.45	21.99	–	22.76
	25	22.63	22.68	23.83	23.06	23.17	24.39
	50	23.19	23.15	24.37	23.63	23.65	25.01
	75	23.8	23.65	25.20	24.23	24.21	25.80
	98	25.18	–	27.32	25.57	–	27.78

Data from Europe comprise findings from the present study (LIFE child) as well as the results of Tideman *et al.* (countries: The Netherlands and UK).[9] Data from China are from Sanz Diez *et al.* (Wuhan, China).[8]

C Truckenbrod *et al.* Axial length growth in a cohort of German children

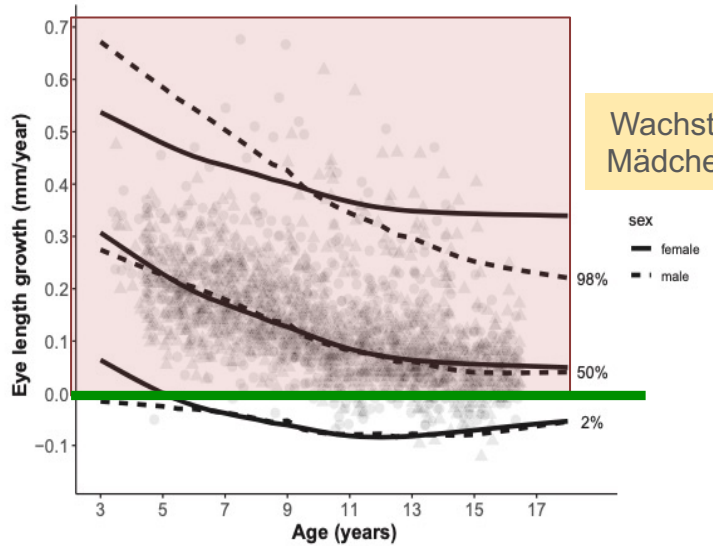

Figure 1. Annual axial length (AL) change in longitudinal data from the LIFE Child Study for girls (solid lines) and boys (dashed lines).

Wachstumsphase
Mädchen > Buben

- AXL Stabilisierung bei Emmetropen <u>ab</u> 15/16 Jahren
- bei Myopen erst ab 18 Jahren

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Zeitpunkt des Ausstiegs

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Discontinuation of orthokeratology on eyeball elongation (DOEE)

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ABSTRACT

Purpose: To evaluate and compare changes in axial elongation, over a 14-month period, in subjects who discontinued and then resumed ortho-k lens wear with those who continued to wear their lenses or spectacles following a 2-year myopia control study.
Method: This single masked, prospective study recruited subjects who had just completed a 2-year myopia control study. Ortho-k subjects were classified as Group OKc, in which subjects continued ortho-k lens wear for the duration of the study; or Group OKd in which subjects discontinued lens wear for seven months and wore single-vision spectacles (Phase I) and then resumed ortho-k lens wear for another seven months (Phase II). Spectacle-wearing control subjects from the initial myopia control study continued wearing spectacles as control subjects. Axial lengths were measured at scheduled visits using the IOLMaster.
Results: Thirteen, 16, and 15 Control, OKc, and OKd subjects, aged 8–14 years, respectively completed the study. Significant increase in axial elongation was found in OKd subjects only in Phase I but not in Phase II. On resuming lens wear, in Phase II, the rate of axial elongation was no longer significantly different from those of the Control or OKc subjects.
Conclusion: Stopping ortho-k lens wear at or before the age of 14 years led to a more rapid increase in axial length; comparable to those wearing spectacles during the initial 2-year myopia control study, but greater than the Control and OKc group in this study. Axial elongation slowed again with resumed lens wear after six months.

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"Rebound" !

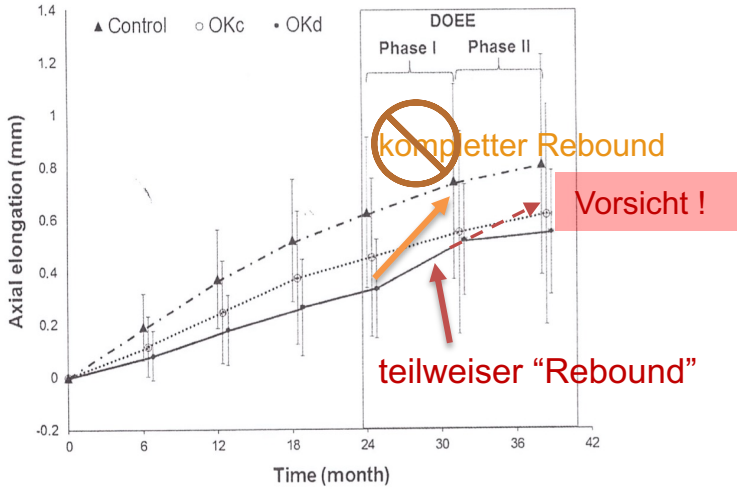

Fig. 2. Axial elongation of the subjects at each visit, including data (retrospective) from subjects' initial 2-year myopia control study. Control – continued to wear single vision spectacles in both Phases of the study; OKc – continued to wear orthokeratology lenses in both Phases of the study; OKd – ceased orthokeratology lens wear for 6 months (Phase I) and then resumed lens wear in Phase II.
Data collection visits for the three groups of subjects were the same but data points shown in the graph are staggered to allow easier view of the error bar. Each error bar represents one standard deviation.

Vorsicht vor teilweisem „Rebound" !

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Myopie Management Pharmazie

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

Phase 3 Report

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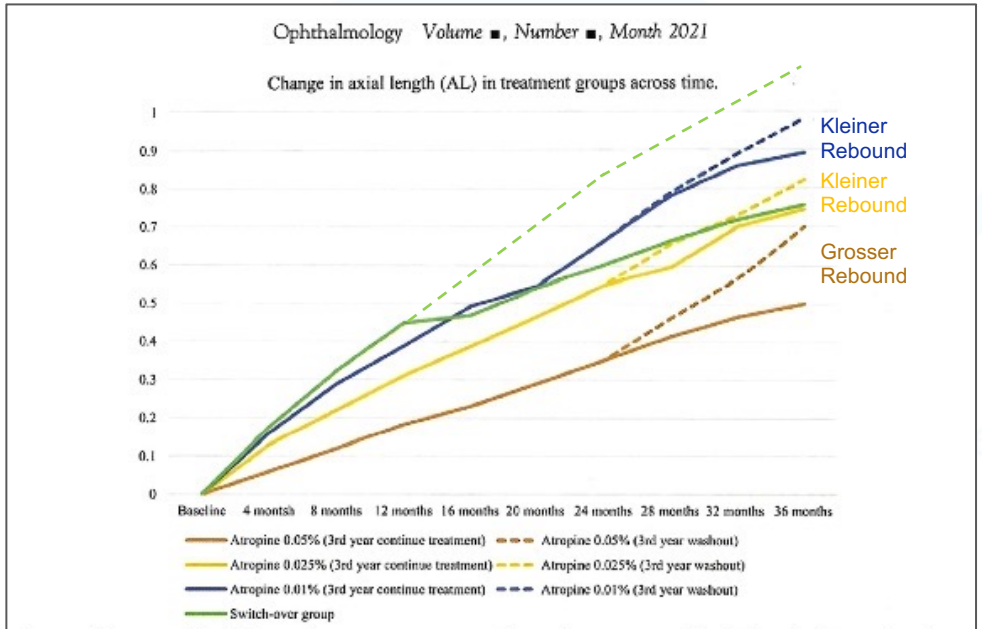

Figure 3. Changes in axial length elongation for treatment groups over time. The switchover group received placebo during the first year and was then switched over to 0.05% atropine at the beginning of the second year and continued 0.05% treatment at the third year. D = diopters; M = months.

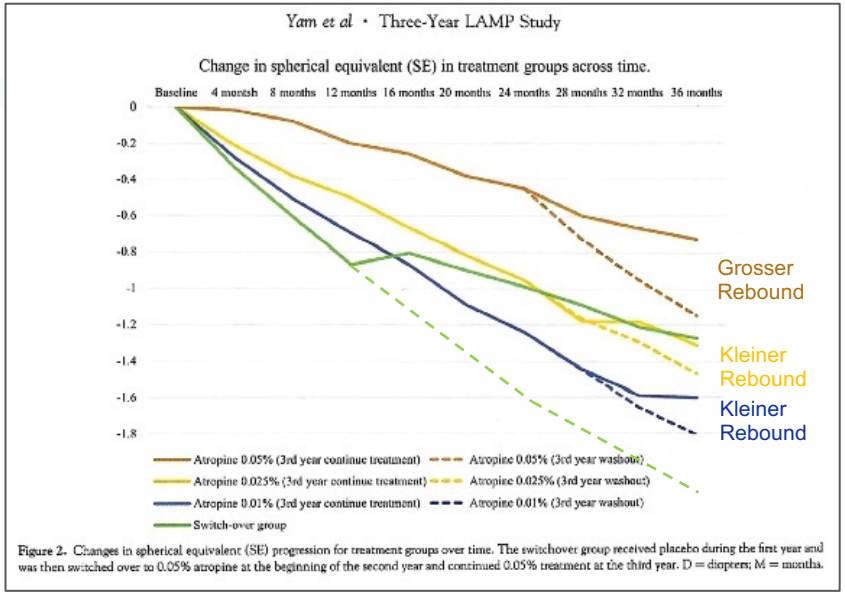

Figure 2. Changes in spherical equivalent (SE) progression for treatment groups over time. The switchover group received placebo during the first year and was then switched over to 0.05% atropine at the beginning of the second year and continued 0.05% treatment at the third year. D = diopters; M = months.

Adaptation zu Plan B statt Rebound !

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Ausstiegs-Strategie

Strategie-Empfehlung Michael Bärtschi *(Stand Sommer 2022):*

Nicht vor 16/18 Jahren*, und dann auch nur wenn :

- refraktive und axiale Daten mind. 2 Jahre stabil innerhalb des alterskorrelierten natürlichen Wachstums geblieben sind
- das aktuelle Risikoprofil gering-mittel ist und
- die AXL der Jugendlichen weiterhin unter 26mm/25.5mm liegt.

Schrittweise Reduktion der Dosierung (Defokus oder %) unter kontinuierlicher Kontrolle der Myopie und der AXL alle 6-12 Monate.

* Holländische, deutsche und australische Wachstumskurven

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Zusammenfassung

- Risiko Profil und Wachstumskurven sind exzellente Entscheidungshilfen und Kommunikationshilfen. Sie sind die wichtige Basis für die Langzeit Betreuung.
- Keine Methode ist für sich alleine genügend für alle Fälle und alle Bedürfnisse/Ansprüche. **Individuelles** und **adaptives** Management !
- Alle drei Säulen (Prävention, Atropin, Peripher Defokus KL/Gläser) sind langjährig klinisch und Evidenz erprobt und auf der ganzen Welt empfohlen.
- Therapie Erfolgsraten von 50%+ sind Langzeit bestätigt.
- Wähle eine dem Risikoprofil, den Fähigkeiten und den Bedürfnissen des Kindes angepasste Therapie aus *(z.B. Alter, aktuelle Myopie und Progressionsrate, aktuelle Sehbedürfnisse, Naharbeit und Hobby, usw)*.
- Neuer Goldstandart zur Bestätigung des Therapie Erfolgs ist die axiale Bulbuslänge (Biometrie).

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Take Home

- Methoden zur Hemmung der Myopie sind verfügbar und empfohlen.
- Agiere früh, mutig, effektiv und konsequent !
- Informiere neutral und Evidenz basiert.
- Die erfolgreichste Therapie wächst mit dem Kind und passt sich ihm an.
- **Adaptiere und kombiniere die Therapie Strategie über Zeit.**
- Synergistische Kooperation von Ophthalmologen und Optometristen sind für den Erfolg eminent und für alle (!) Beteiligten sinnvoll.

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„Merci viu Mau !“

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