

Sehen oder nicht sehen ?

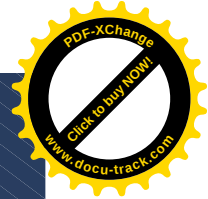
Ortho-K Kontaktlinsen

Michael Bärtschi

M.S.Optom., M.Med.Educ., F.A.A.O., SBAO

Kontaktlinsen-Studio Bärtschi und Universitäts Augenklinik Basel



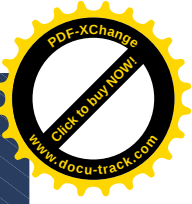


SBAO Tagung 1996 in Bern

1 - Day

=

1 - Way ?



A b l a u f

Zeit : 60 Minuten (?)

- Physiologie Up-date
- Anpassung
- High-Lights
- Troubles und Trouble-Shooting



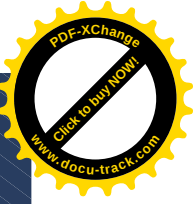
Geschichte

Es war einmal vor vielen Millionen Jahren



Ortho-Geologie





Zielpersonen

Engagierte und routinierte RGP

Kontaktlinsenanpasser mit Neigung
zu Innovation und Perfektion.



Lernziele

Jeder Teilnehmer :

- Repetiert sehr kurz die Hornhautanatomie und die Wirkungsweise von OK
- Vertieft und erneuert sein Wissen bezüglich Auswirkungen auf die Hornhautschichten



Fragen die sich so stellen :

- Ist Ortho-K wirklich vollständig reversibel ?
- Was geschieht mit dem Epithel und den darunter liegenden Schichten wirklich ?
- Welche Befürchtungen haben die Skeptiker bei Ortho-K ?
- Sind Komplikationen bekannt ?



Fragen die sich so stellen :



Ortho-K ist ziemlich anders als wir es
uns gewohnt sind.

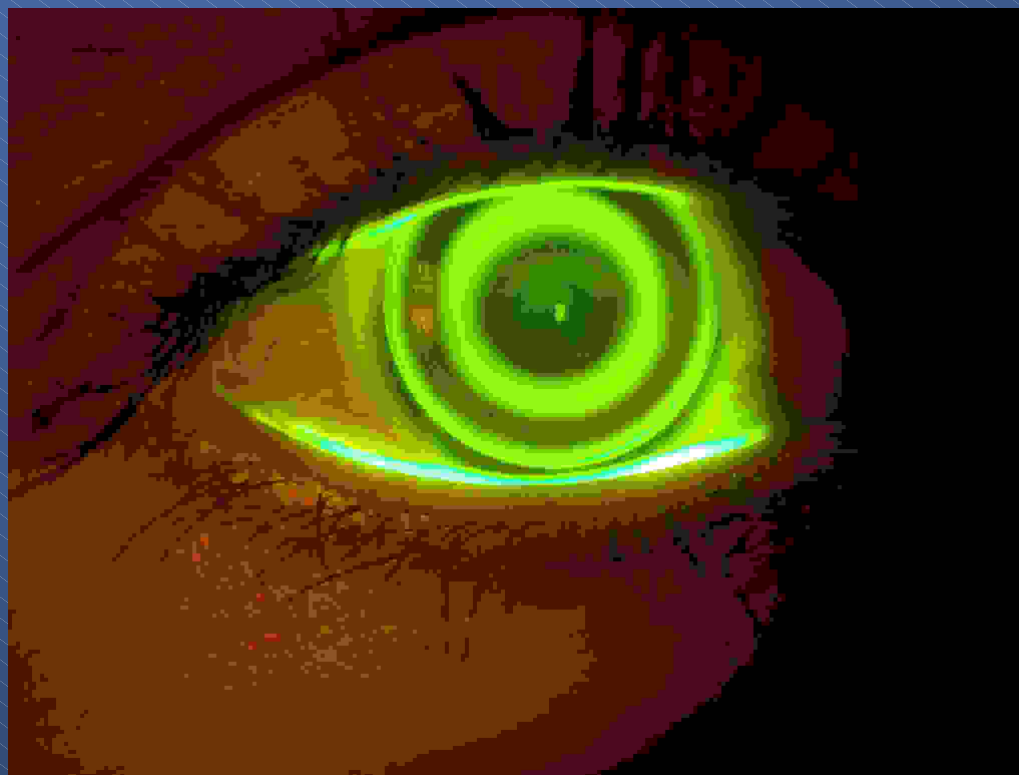


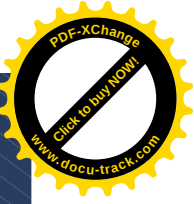


Das Team ohne das nichts funktionieren würde !



Und nun :
Ab in die Höhle des Löwen





Ortho-K

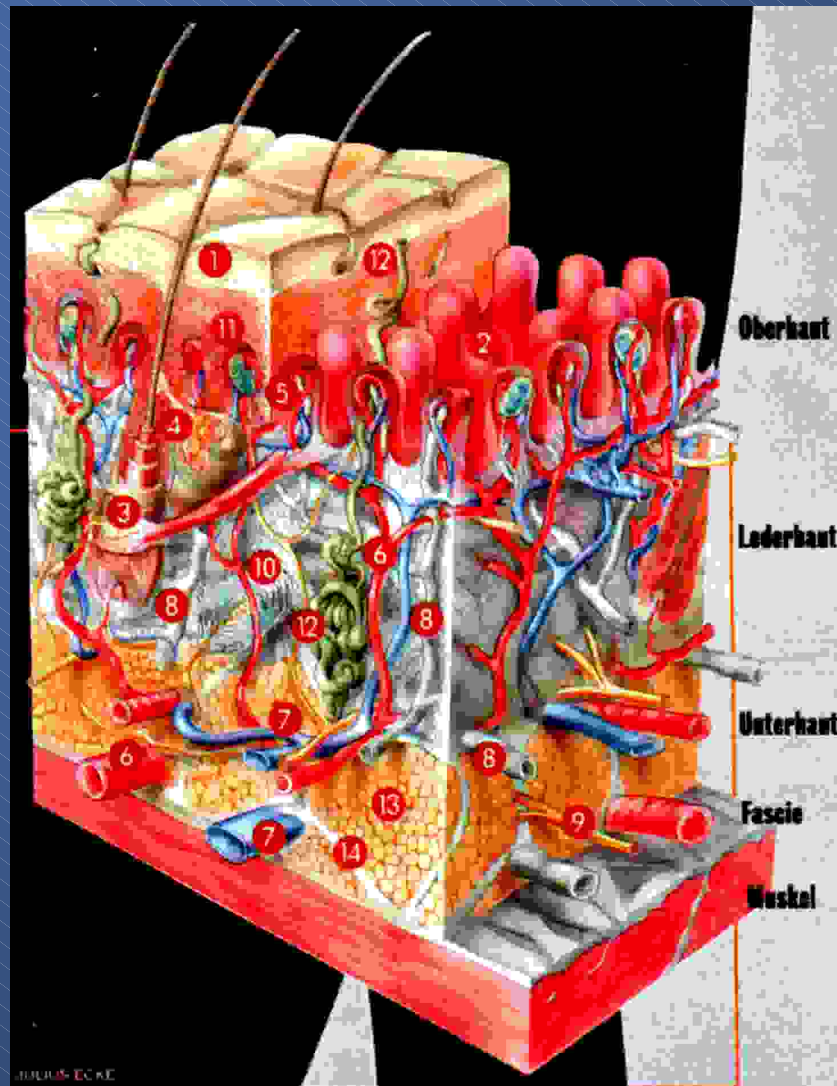
Physiologie Up-Date

Stand März 2004



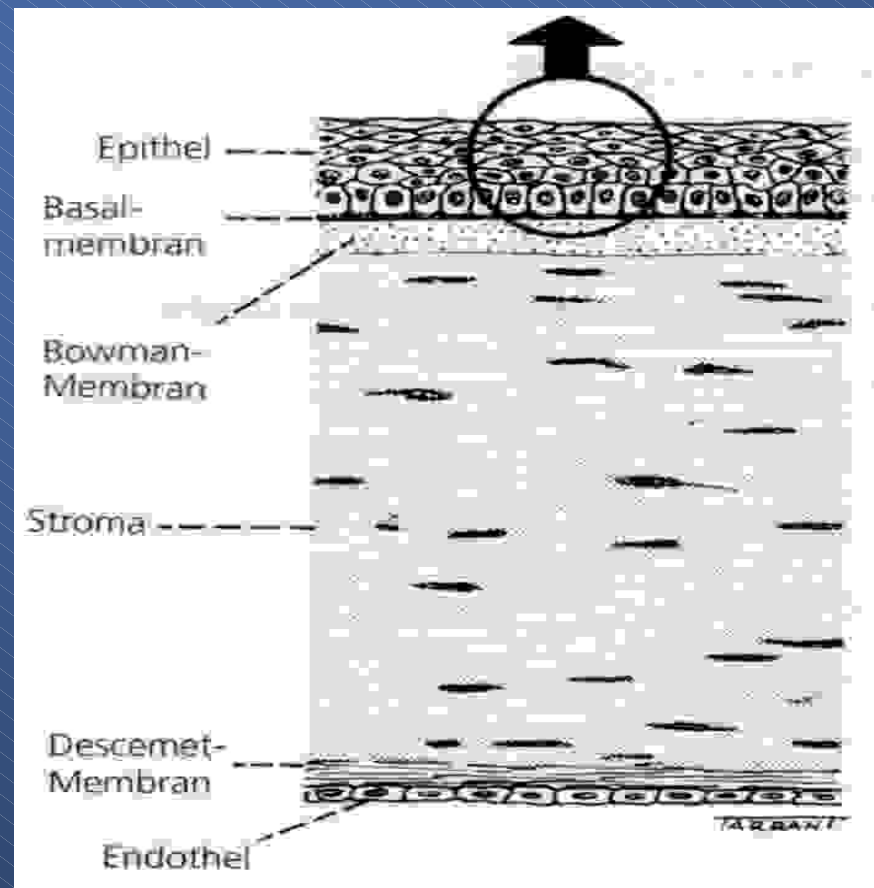
Anatomie

Die Haut :



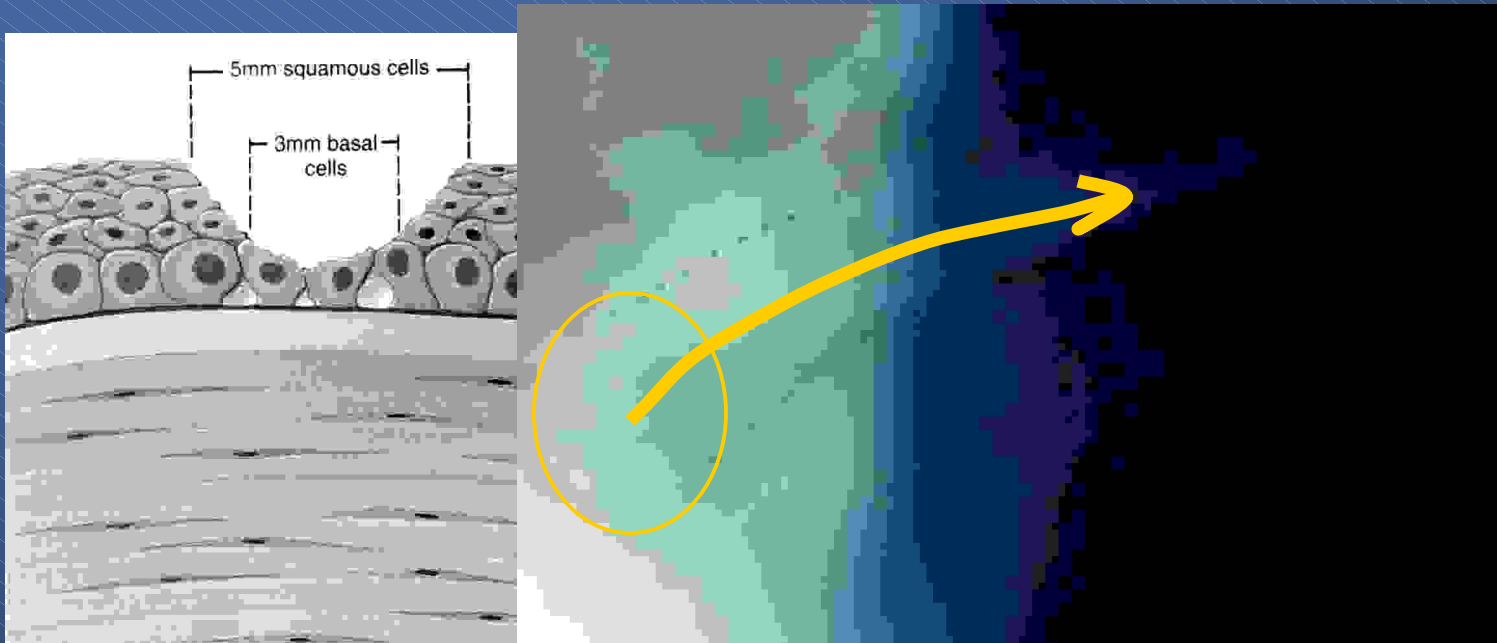
Anatomie

Die Hornhaut : aus Jack .J Kanski Lehrbuch der klinischen Ophthalmologie 1996



Anatomie

Die Hornhautschichten : aus Jack .J Kanski „Lehrbuch der klinischen Ophthalmologie“ 1996 und Louis J. Catania
„Primary care of the anterior Segment“ 1995



Epithel und Basalzellen : Dicke 50-55 micron, hohe Mitoserate, wanderungsfähig

Basalmembran : Dicke < 3 micron, sehr geringe Mitoserate, Trennschicht

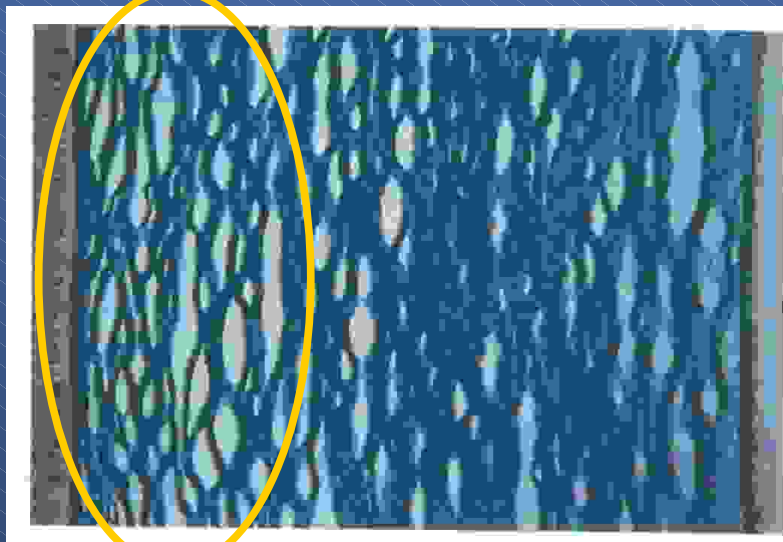
Bowman Membran : Dicke 7-14 micron, mechanisch widerstandsfähig



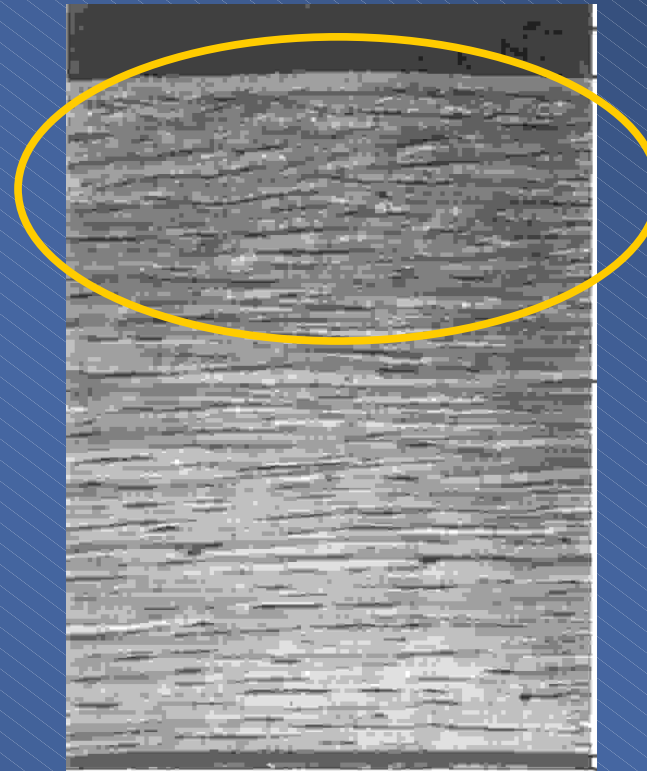
Anatomie

Die Hornhautschichten :

aus Werner Maidowski „Anatomie des Auges“ 1980



aus Herbert Kaufman „The Cornea“ 2000



Das Stroma

Dicke : 450-500 microns, Nerven, Schwann Zellen, lockere Kollagenfibrillen
v.a. im vorderen Drittel, regelmässiger und dichter posterior



Physiologie

Das stimmt auch weiterhin im Grundsatz,
aber es gibt auch neue Erkenntnisse für Ortho-K !

- Epithelkompression
- Epitheldicke
- Hornhautschwellung
- Endotheldurchbiegung
- Aberrationszunahme





Epithelkompression

Eye Contact Lens. 2003 Jul;29(3):137-45.

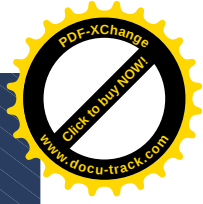
Overnight orthokeratology: visual and corneal changes.

Soni PS, Nguyen TT, Bonanno JA.

Borish Center for Ophthalmic Research, School of Optometry, Indiana University, Bloomington, IN 47401, USA.
sonip@indiana.edu

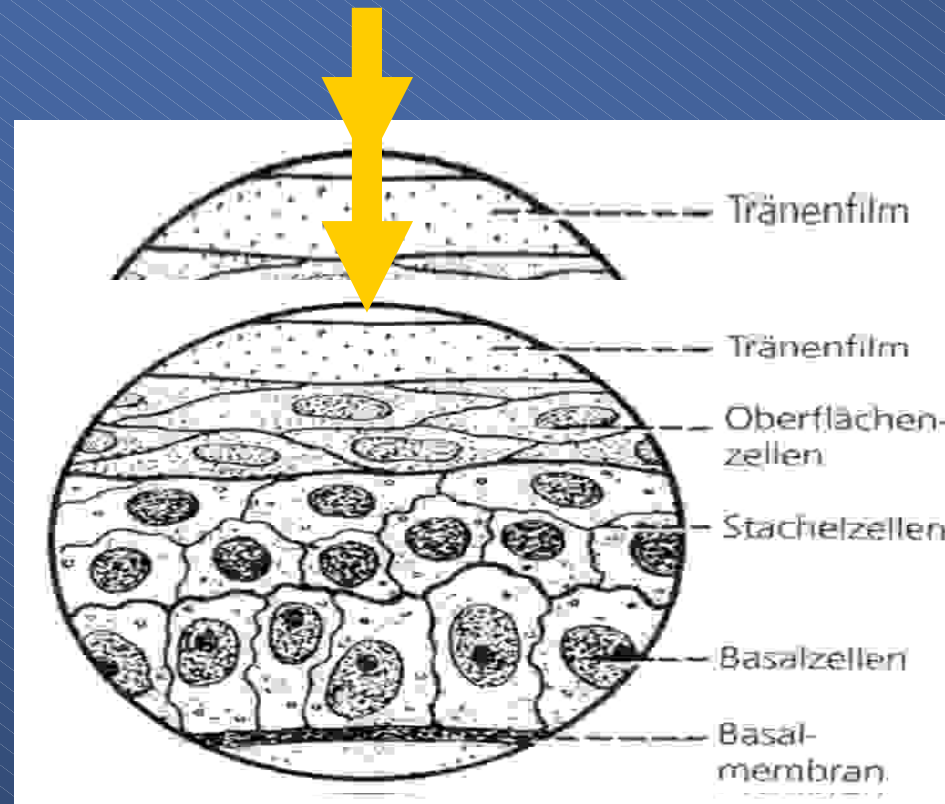
PURPOSE: To achieve an optimal fit with reverse geometry Contex OK lenses and to determine a time course for and the stability of visual and corneal changes in achieving maximal refractive, corneal curvature, and corneal thickness changes after overnight wear of OK B and D series lenses. **METHODS:** This investigation was conducted under an Food and Drug Administration IDE G000059. Both eyes of 10 subjects were fitted with the lenses, and uncorrected visual acuity, refractive correction, contrast sensitivity, corneal curvature, and corneal thickness were measured at baseline and at 1 day, 1 week, 1 month, and 3 months after lenses were worn. Except for baseline, data were collected at four different times during the day, immediately following lens removal and 4, 8, and 12 hours after lens removal. **RESULTS:** The results from eight subjects showed that uncorrected visual acuity, refractive correction, contrast sensitivity, and corneal curvature all changed significantly ($P=0.01$) overnight. By the end of 1 week, all corneal and visual changes had reached a maximal level and remained fairly stable during the day. These changes were sustained at 3 months. The epithelial thickness data from four subjects showed that the **corneal epithelial thickness was reduced by approximately 19 micron after 3 months of lens wear.**

CONCLUSIONS: Successful fitting of OK B and D series lenses requires a thorough understanding of the lens-cornea relationship. **Full effect of overnight orthokeratology is achieved by the end of 1 week. The visual and corneal changes remain stable for all waking hours of the day and allow patients to enjoy excellent device-free vision (20/20).**



Epithelkompression

Konfokale Mikroskopieuntersuchungen durch Frau Dr. med. Gudrun Bischoff, Hamburg 2003
(pers. Korrespondenz, noch unveröffentlicht)



Epithelkompression

Contact Lens and Anterior Eye. 2003(December); Vol. 26, 4: 205

Piggyback Orthokeratology

Suzanne Effron et al.

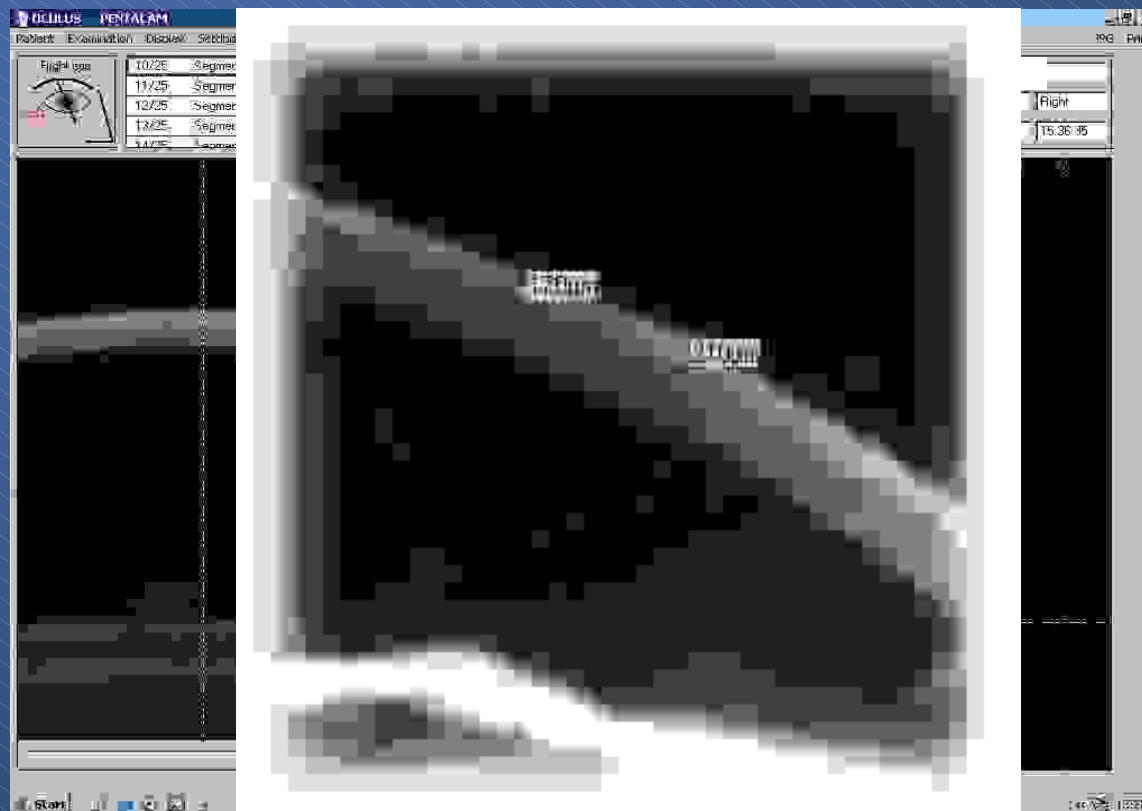
„ The effect of reverse geometry lenses on the cornea is multifactorial and probably includes a physical moulding component as originally hypothesised.“

Anmerkung : Maximal 1 dpt ist (nach längerer Behandlungsdauer) mittels Flachanpassung erreichbar. Diese Resultate sind aus den 60er und 70 Jahren bekannt. (Jeff (1962), Ziff (1968), Nolan (1969) und andere)
Doch woher kommt dann der Rest der Wirkung ?

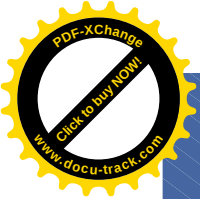


Epitheldicke

Untersuchungen durch Michael Wyss, Nina Müller und Michael Bärtschi, Bern 2003-2004



Epitheldickenveränderungen erkennbar, doch bisher noch nicht einwandfrei auswertbar.



Epitheldicke (Parallelanpassung)

Ophthalmology. 2001 Jul;108(7):1279-88.

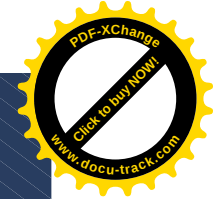
Effects of rigid and soft contact lens daily wear on corneal epithelium, tear lactate dehydrogenase, and bacterial binding to exfoliated epithelial cells.

Ladage PM, Yamamoto K, Ren DH, Li L, Jester JV, Petroll WM, Cavanagh HD.

Department of Ophthalmology, The University of Texas Southwestern Medical Center at Dallas, 75390-9057, USA.

OBJECTIVE: To determine the effects of lens type and oxygen transmissibility on human corneal epithelium during daily lens wear (DW). **DESIGN:** Prospective, randomized, double-masked, single-center, parallel treatment groups clinical trial. **PARTICIPANTS:** Two hundred forty-six patients fitted with: (1) high oxygen-transmissible soft lenses ($n = 36$), (2) hyper oxygen-transmissible soft lenses ($n = 135$), and (3) hyper oxygen-transmissible rigid gas-permeable (RGP) lenses ($n = 75$). **INTERVENTION:** Irrigation chamber to collect exfoliated epithelial surface cells, confocal microscopy, and tear collection at baseline, 2 weeks, and 4 weeks of DW. **MAIN OUTCOME MEASURES:** (1) *Pseudomonas aeruginosa* (PA) binding to exfoliated corneal epithelial surface cells, (2) central epithelial thickness, (3) superficial epithelial cell area, (4) epithelial surface cell exfoliation, and (5) tear lactate dehydrogenase (LDH). **RESULTS:** Four weeks of DW with the high oxygen-transmissible soft lens significantly increased PA binding from baseline 6.55 ± 3.01 to 8.75 ± 3.05 bacteria per epithelial cell ($P < 0.01$). By contrast, hyper oxygen-transmissible soft lens wear increased binding significantly less (6.13 ± 2.45 to 7.62 ± 3.06 ; $P < 0.01$), whereas hyper oxygen-transmissible RGP lens wear demonstrated no significant changes (5.91 ± 2.40 to 6.13 ± 2.17 ; $P = 0.533$).

No significant change in central epithelial thickness was found after 4 weeks of DW in either soft lens; however, the epithelial thickness decreased by 9.8% ($P < 0.001$) with RGP lens wear. Epithelial cell surface area increased 3.3% and 4.1% with the high and hyper oxygen-transmissible soft lenses, respectively, and 10.5% with the hyper oxygen-transmissible RGP lens ($P < 0.001$). Epithelial desquamation significantly decreased in all groups ($P < 0.001$). Tear LDH levels increased for all test lenses ($P < 0.001$). **CONCLUSIONS:** Increased PA binding induced by wear of a conventional soft lens material is significantly greater than that induced by the new hyper oxygen-transmissible soft silicone hydrogel lens during DW. However, both soft materials showed significant increases in PA binding as compared with baseline controls. By contrast, hyper oxygen-transmissible RGP lens DW did not increase PA binding significantly. Taken together, these findings suggest for the first time both an oxygen effect as well as a difference between soft and rigid lens types on PA binding in DW.



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Effects of rigid and soft contact lens daily wear on corneal epithelium, tear lactate dehydrogenase, and bacterial binding to exfoliated epithelial cells.

Ladage PM, Yamamoto K, Ren DH, Li L, Jester JV, Petroll WM, Cavanagh HD.

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OBJECTIVE: To determine the effects of lens type and oxygen transmissibility on human corneal epithelium during daily lens wear (DW). **DESIGN:** Prospective, randomized, double-masked, single-center, parallel treatment groups clinical trial. **PARTICIPANTS:** Two hundred forty-six patients fitted with: (1) high oxygen-transmissible soft lenses ($n = 36$), (2) hyper oxygen-transmissible soft lenses ($n = 135$), and (3) hyper oxygen-transmissible rigid gas-permeable (RGP) lenses ($n = 75$). **INTERVENTION:** Irrigation chamber to collect exfoliated epithelial surface cells, confocal microscopy, and tear collection at baseline, 2 weeks, and 4 weeks of DW. **MAIN OUTCOME MEASURES:** (1) *Pseudomonas aeruginosa* (PA) binding to exfoliated corneal epithelial surface cells, (2) central epithelial thickness, (3) superficial epithelial cell area, (4) epithelial surface cell exfoliation, and (5) tear lactate dehydrogenase (LDH). **RESULTS:** Four weeks of DW with the **high oxygen-transmissible soft lens significantly increased PA binding from baseline 6.55 ± 3.01 to 8.75 ± 3.05 bacteria per epithelial cell ($P < 0.01$). By contrast, hyper oxygen-transmissible soft lens wear increased binding significantly less (6.13 ± 2.45 to 7.62 ± 3.06 ; $P < 0.01$), whereas hyper oxygen-transmissible RGP lens wear demonstrated no significant changes (5.91 ± 2.40 to 6.13 ± 2.17 ; $P = 0.533$). No significant change in central epithelial thickness was found after 4 weeks of DW in either soft lens; however, the epithelial thickness decreased by 9.8% ($P < 0.001$) with RGP lens wear. Epithelial cell surface area increased 3.3% and 4.1% with the high and hyper oxygen-transmissible soft lenses, respectively, and 10.5% with the hyper oxygen-transmissible RGP lens ($P < 0.001$). Epithelial desquamation significantly decreased in all groups ($P < 0.001$). Tear LDH levels increased for all test lenses ($P < 0.001$). **CONCLUSIONS:** Increased PA binding induced by wear of a conventional soft lens material is significantly greater than that induced by the new hyper oxygen-transmissible soft silicone hydrogel lens during DW. However, both soft materials showed significant increases in PA binding as compared with baseline controls. By contrast, hyper oxygen-transmissible RGP lens DW did not increase PA binding significantly. Taken together, these findings suggest for the first time both an oxygen effect as well as a difference between soft and rigid lens types on PA binding in DW.**





Stromaschwellung

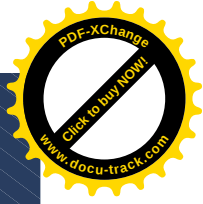
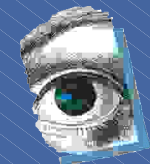
Invest Ophthalmol Vis Sci. 2003 Jun;44(6):2518-23.

The effects of overnight orthokeratology lens wear on corneal thickness.

Alharbi A, Swarbrick HA.

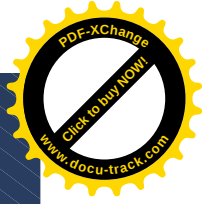
School of Optometry and Vision Science, University of New South Wales, Sydney, Australia.

PURPOSE: To investigate corneal thickness changes during overnight orthokeratology with reverse-geometry rigid gas-permeable (RGP) contact lenses worn over a 3-month period. **METHODS:** Eighteen young adult subjects with low myopia (≤ -4.00 D) were fitted with reverse-geometry lenses (BE; UltraVision Pty. Ltd., Brisbane, Queensland, Australia), which were worn for 3 months on an overnight basis and were removed during the day. Another 10 subjects were fitted with conventional RGP lenses (J-Contour; UltraVision) that were worn for 1 month in the right eye on a similar wearing schedule; the left eye acted as a non-lens-wearing control. Refractive error was recorded in the morning and evening, and total, epithelial, and stromal corneal thicknesses were measured across the horizontal meridian with an **optical pachometer**. **RESULTS:** The orthokeratology group showed significant reductions in myopia ($+1.66 \pm 0.50$ D; $P < 0.001$) from day 1, which stabilized by day 10. **Central corneal thinning (-9.3 ± 5.3 micron, $P < 0.001$), which was epithelial in origin, was found from day 1; central stromal change was negligible. Midperipheral corneal thickening, which was stromal in origin, was confirmed by day 4 ($+10.9 \pm 5.9$ micron, $P < 0.001$). No change was found in peripheral corneal thickness.** Analysis of day-90 data by Munnerlyn's formula indicated that corneal sagittal height change resulting from the thickness changes could account for the refractive effect. In the conventional RGP group, there were no significant changes in refractive error or corneal thickness. **CONCLUSIONS: Overnight orthokeratology causes rapid central corneal epithelial thinning and midperipheral stromal thickening.** The consequent change in corneal sagittal height is the primary factor underlying the refractive effect of orthokeratology.





Stromaschwellung



Untersuchungen durch Lyndon Jones, PhD und Desmond Fonn, DipOptom,
Center for Contact Lens Research, Waterloo, Canada Wissenschaftliches
Papier, AAO Dallas 2003 S.243

„At removal on Day 1, the central and paracentral cornea swelled by 5% and 7%
respectively.,,

„ There appeared to be an adaptation to over night lens wear as the swelling
decreased from 5% following lens removal on the first day of study to 3% on the
remaining three study mornings.“ (1, 4, 10, 28 days)

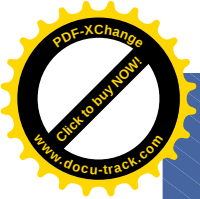
(Messung mit Optical Coherence Tomography)



Endotheldurchbiegung

Untersuchungen durch Michael Wyss, Nina Müller und Michael Bärtschi, Bern 2003-2004

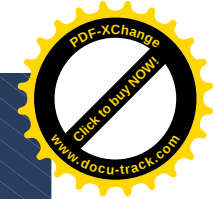


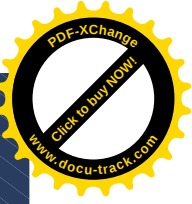


Aberrationszunahme

Pete Kollbaum, OD und Arthur Bradley, PhD Indiana University
Wissenschaftliches Papier, AAO Dallas 2003 S. 244

„As expected, after wearing the lenses, average daily myopia was decreased from -3.49 ± 0.80 D at baseline to -0.52 ± 0.24 D at 1 month. However, with this decrease in myopia, average daily spherical aberration increased from $+0.07 \pm 0.05$ D at baseline to $+0.18 \pm 0.06$ D at 1 month. This amounts to an increase of **0.04 D** in spherical aberration per diopter of corrected myopia. This is compared to the amount of spherical aberration observed following refractive surgery of **0.1 to 0.15 D** per diopter of corrected refractive error.“





A r g u m e n t e der Gegner

Die Linsen saugen sich
doch einfach fest !



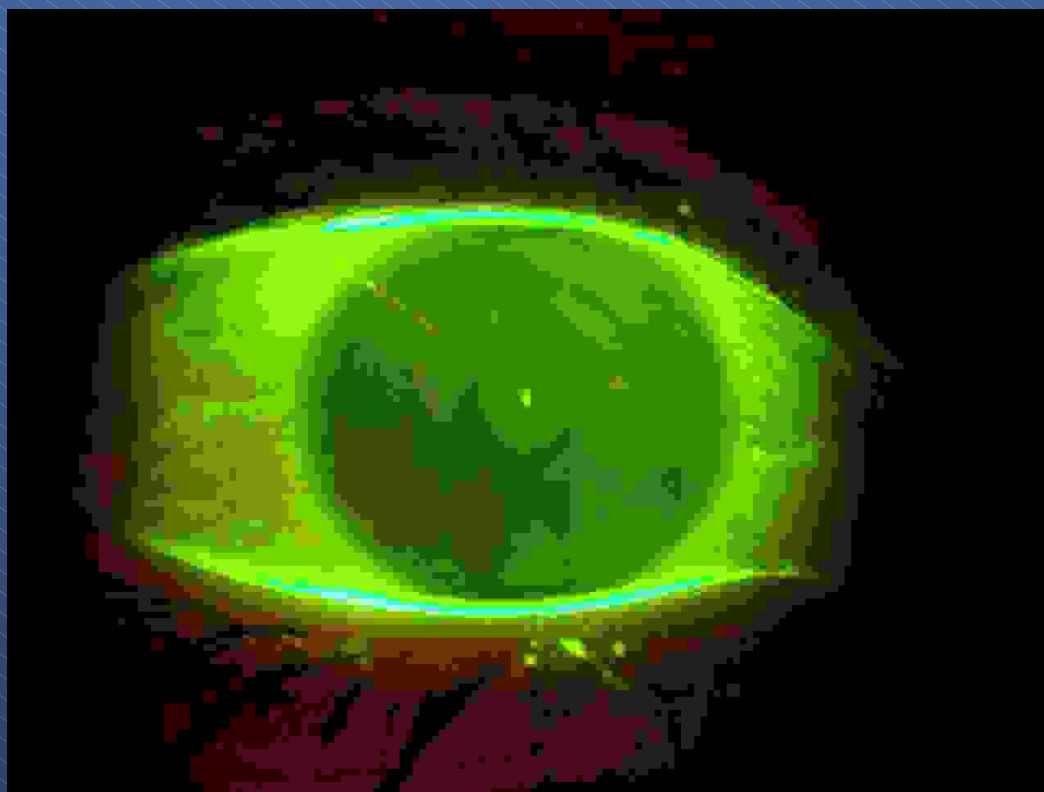
... und die Antwort des Praktikers

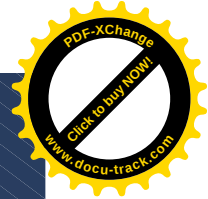
Die Linsen sind nach dem Aufsetzen genau
so beweglich wie jede andere stabile Linse.



... und die Antwort des Praktikers

Es empfiehlt sich vor dem Herausnehmen der Linsen kurz die Augen mit wässriger Lösung nach zu benetzen. (zB. NaCl, Refresh Contact)





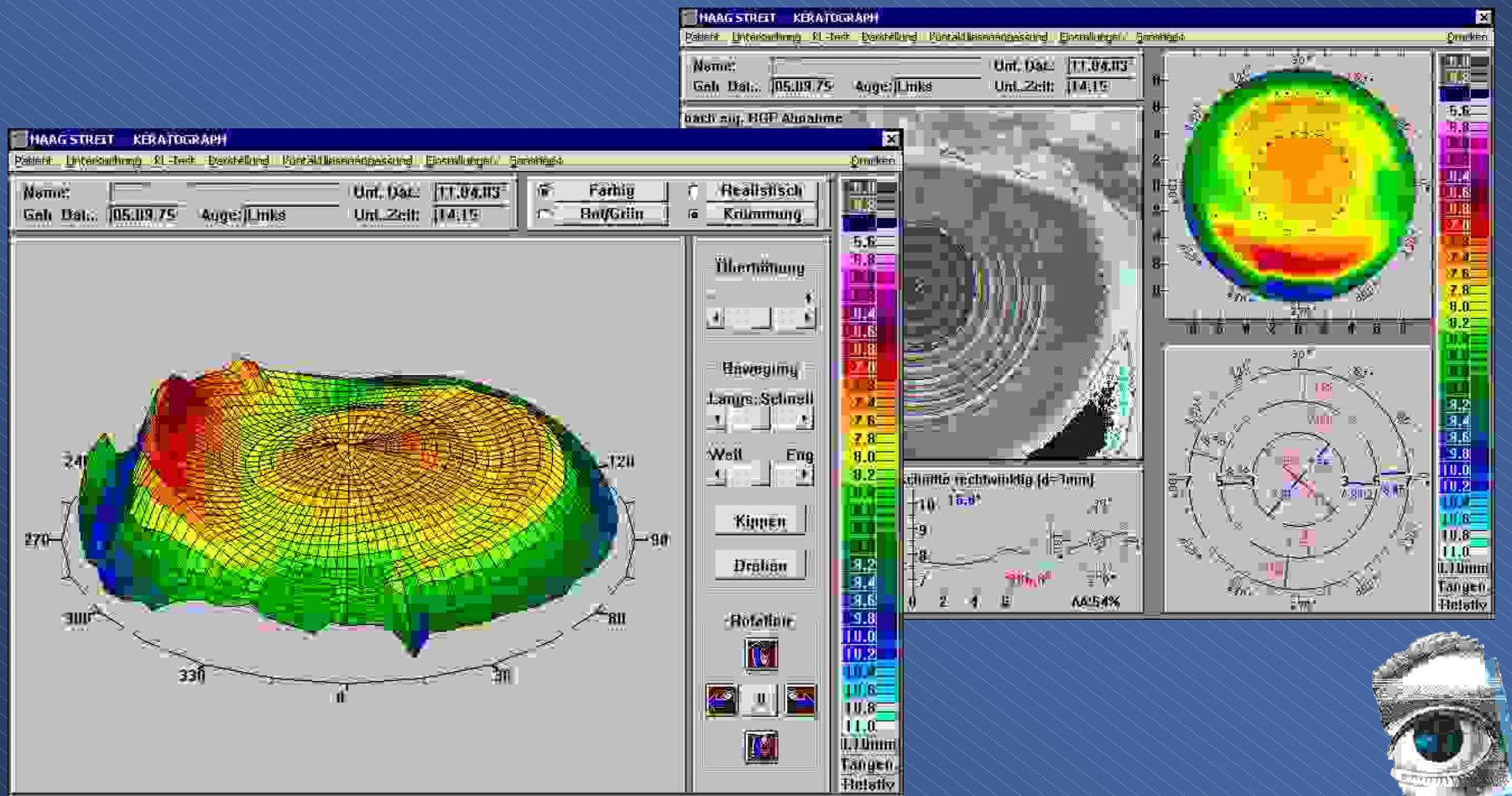
A r g u m e n t e der Gegner

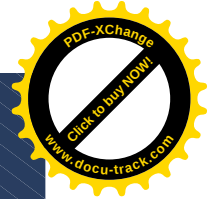
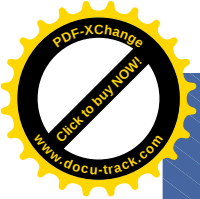
Es fehlen Langzeiterfahrungen !



... und die Antwort vom Praktiker

Leider haben wir schon seeehhhr viel und lange Erfahrung !

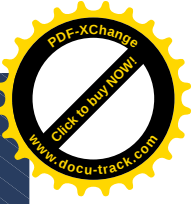




... und die Antwort aus der wissenschaftlichen Literatur

- Contacto 6 **1962** (7);200-204
Orthofocus technique. Jessen GN
- J Am Optom Assoc **1968** Feb;39(2):143-7
Orthokeratology. 1. Ziff SL.
- J Am Optom Assoc **1969** Mar;40(3):303-5
Approach to orthokeratology. Nolan JA.
- Klin Monatsbl Augenheilkd **1973** Sep;163(3):383-7
Orthokeratology and its dangers for the patient and for the ophthalmologist (author's transl) Alexander-Katz W.

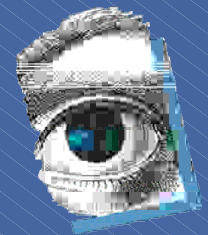


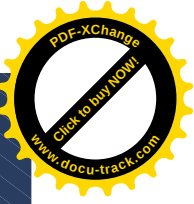


A r g u m e n t e der Gegner

Sauerstoffmangel und

Infektionsrisiko sind viel zu hoch !





Komplikationen

Pseudomonas / Serratia marcescens Infektion

- Cornea 2003 Apr;22(3):265-6

Orthokeratology Lens-Related Pseudomonas aeruginosa Infectious Keratitis.

Young AL, Leung AT, Cheung EY, Cheng LL, Wong AK, Lam DS.

- Cornea 2003 Apr;22(3):262-4

Pseudomonas corneal ulcer related to overnight orthokeratology.

Lau LI, Wu CC, Lee SM, Hsu WM.

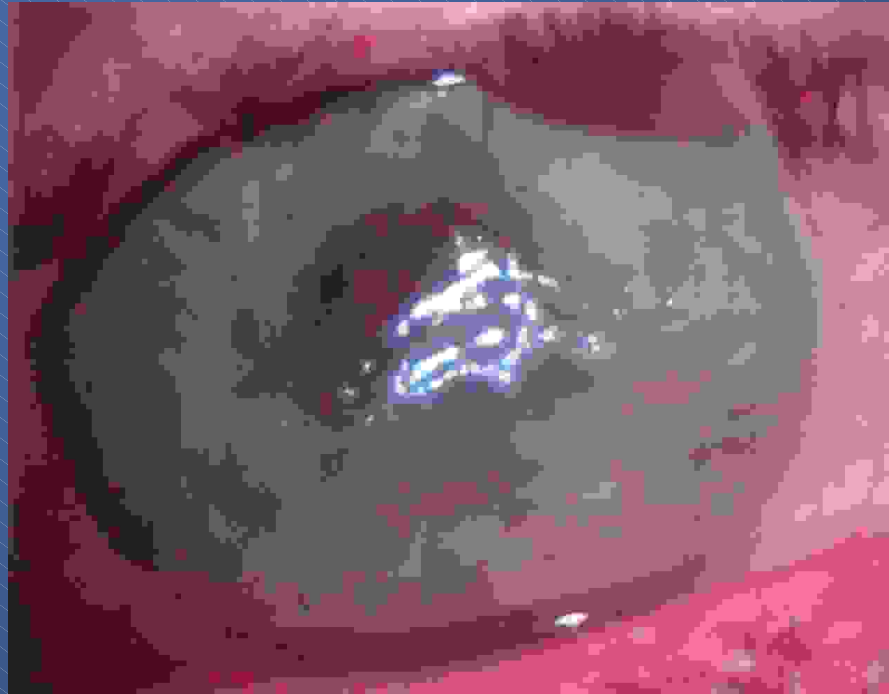
- Am J Ophthalmol 2001 Aug;132(2):257-8

Serratia Marcescens corneal ulcer as a complication of orthokeratology.

Chen KH, Kuang TM, Hsu WM.

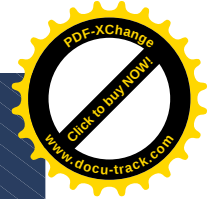
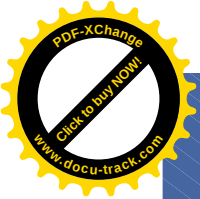


Komplikationen



Kultur negative Hornhautulzeration bei Lidschlussinkompetenz





... und die Antwort aus der wissenschaftlichen Literatur

- Surv Ophthalmol 1980 Mar-Apr;24(5):291, 298-302

Orthokeratology. II. **A risky and unpredictable 'treatment' for a benign condition.**
Safir A.

- Surv Ophthalmol 1980 Mar-Apr;24(5):291-7

Orthokeratology. I. **A safe and effective treatment for a disabling problem.**
Grant SC.

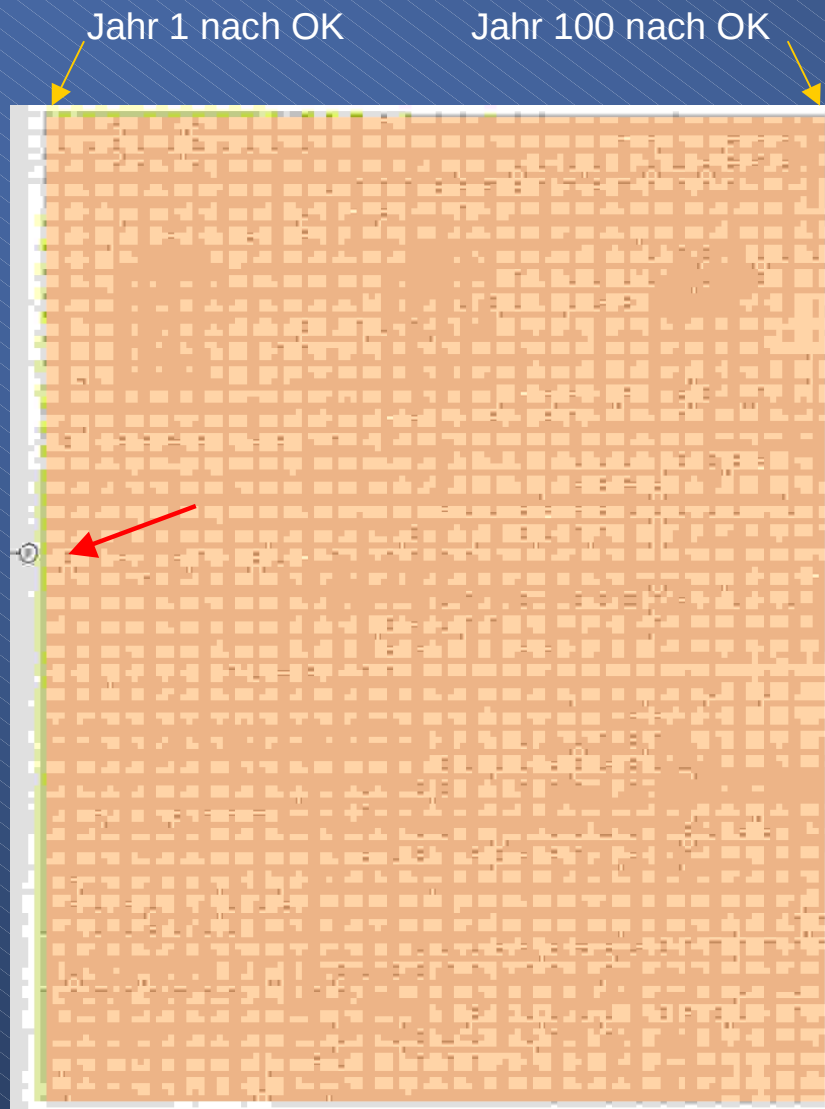
- Am J Optom Physiol Opt 1983 Apr;60(4):321-8

The Berkeley Orthokeratology Study, part III: safety. Polse KA, Brand RJ, Keener RJ, Schwalbe JS, Vastine DW.

„It appears that OK treatment is safe“



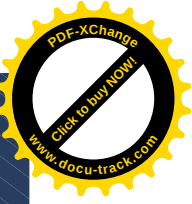
... und die Antwort des Praktikers



Das Risiko für
mikrobielle Keratitis
beträgt beim RGP EW
Tragen interpoliert 1 zu
10'000 pro Tragejahr.

(FDA Daten, genaue Zahlen für
reines OK Tragen noch nicht
publiziert)

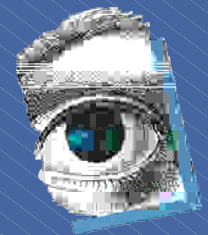


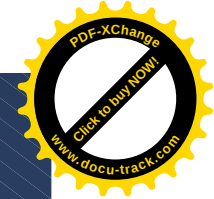
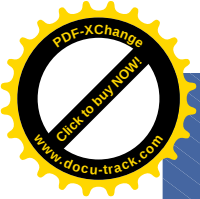


A r g u m e n t e der Gegner

Das Resultat ist gar nicht

berechenbar und kontrollierbar !





... und die Antwort aus der wissenschaftlichen Literatur

- Optom Vis Sci 2000 May;77(5):252-9

Overnight orthokeratology.

Nichols JJ, Marsich MM, Nguyen M, Barr JT, Bullimore MA.

„The central cornea also showed significant thinning (mean change, -12 ± 11 microm at day 60).

CONCLUSIONS: Overnight orthokeratology is an effective means of temporarily reducing myopia.“

- Optom Vis Sci 2003 Mar;80(3):200-6

Corneal response to short-term orthokeratology lens wear.

Sridharan R, Swarbrick H.

„CONCLUSIONS: The cornea responds rapidly to the application of reverse-geometry lenses for orthokeratology, with significant central corneal flattening and improvement in visual acuity after just 10 min of lens wear. This suggests that the corneal epithelium is able to be molded or redistributed very rapidly in response to the tear film forces generated behind reverse-geometry lenses.“

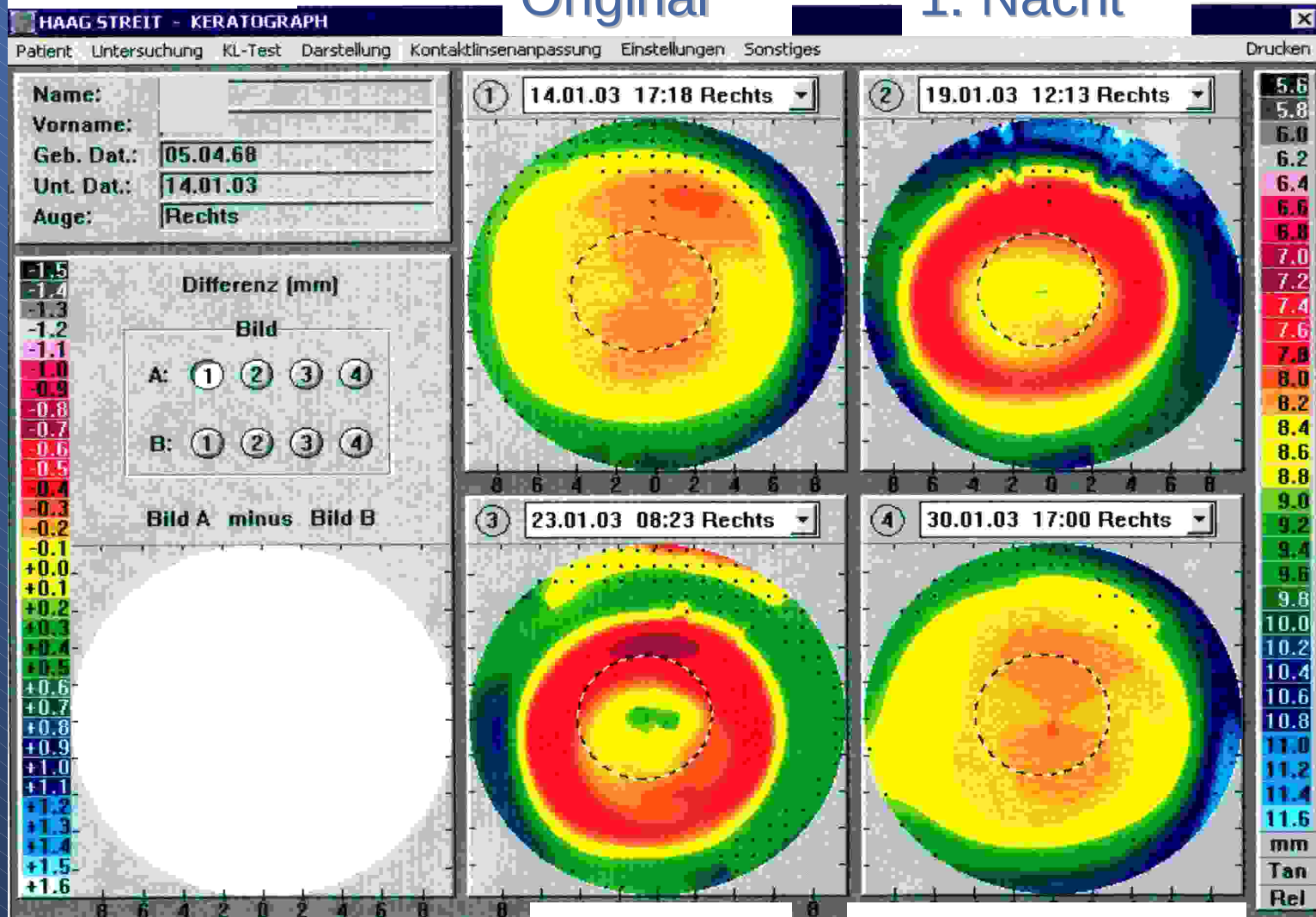


... und die Antwortdes Praktikers

Rx -5,50

Original

1. Nacht





Anpass Technik



Damit Ortho-K nicht ins Auge geht !



Lernziele

Jeder Teilnehmer :

- Repetiert kurz das Anpassprozedere
- Vertieft und erneuert sein Wissen bezüglich Indikationen und Kontraindikationen
- Lernt torische OK Linsen kennen



I n d i k a t i o n e n

- Myopie zwischen $-0,75$ bis $-6,0$ dpt (?)
- Astigmatismen bis -3 dpt (?)
- Hornhautradien von $7,20$ bis $8,40$ mm
- nE. zwischen $0,3$ bis $0,65$ (?)
- Reguläre Hornhautoberfläche
- Gesunde Augen
- Gesundes Allgemeinbefinden
- Alternierendes Sehen bei Presbyopie



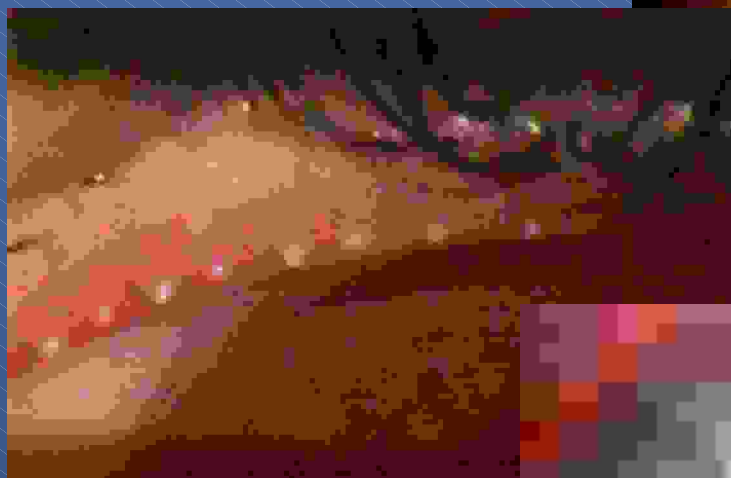
Kontra-Indikationen

Erkrankungen des Auges :

Der Hornhaut



Der Lider



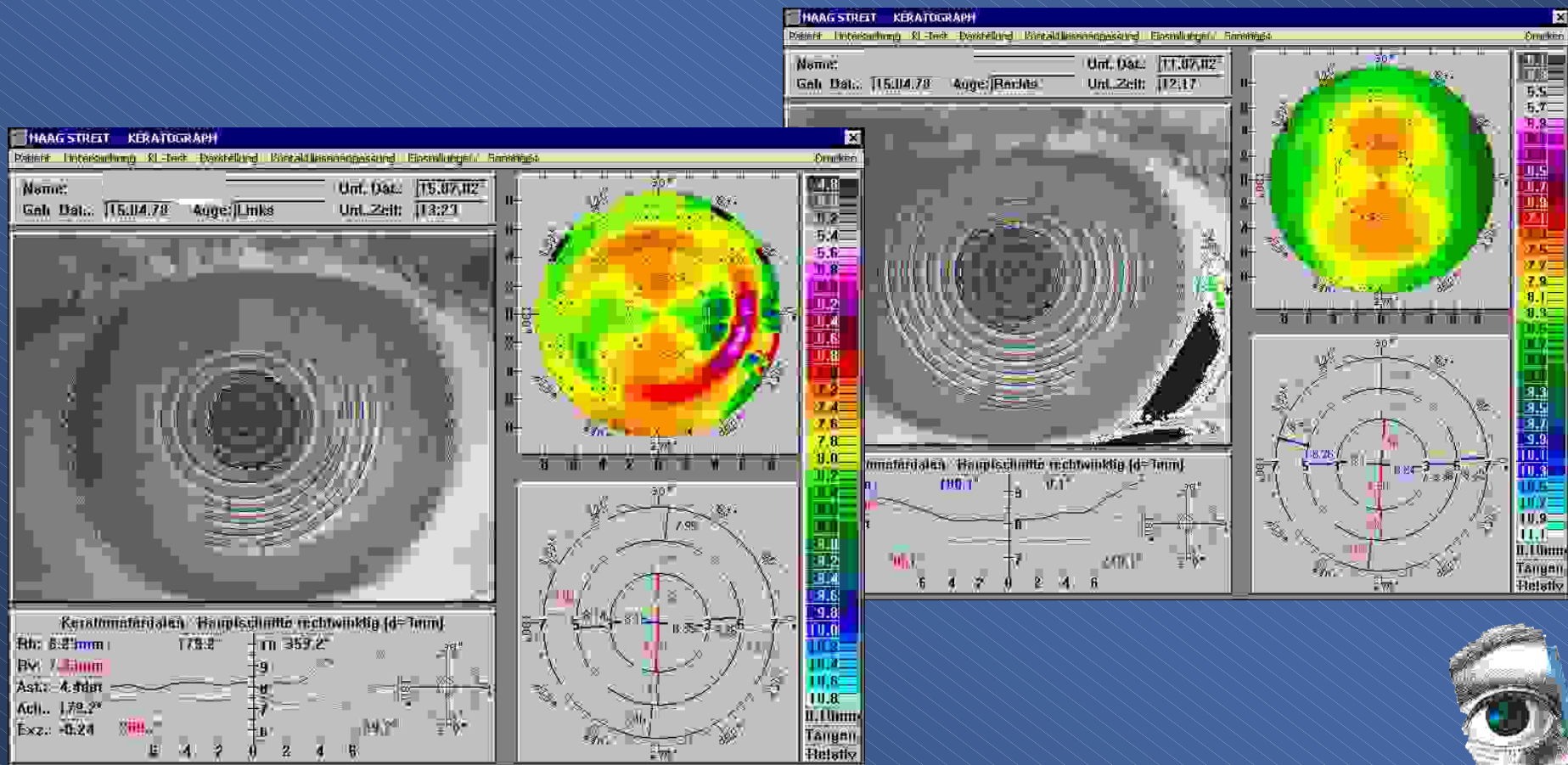
Des Tränenapparates



Kontra-Indikationen

Ametropien :

Hyperopie, Myopie > 6 dpt, Astigmatismen > 3 dpt

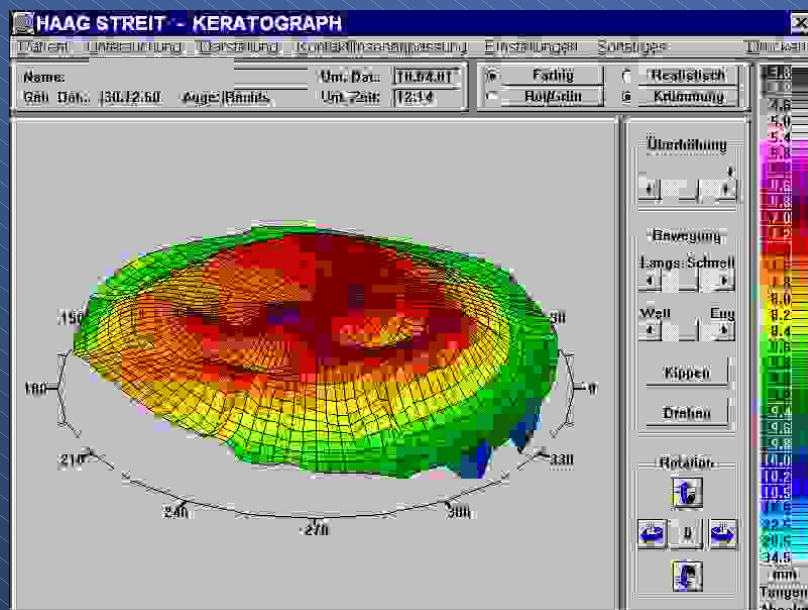


Kontra-Indikationen

Hornhautgeometrie :

Steil = $< 7,20$ mm und zusätzlich $nE < 0,30$

Flach = $> 8,40$ mm und zusätzlich $nE > 0,60$

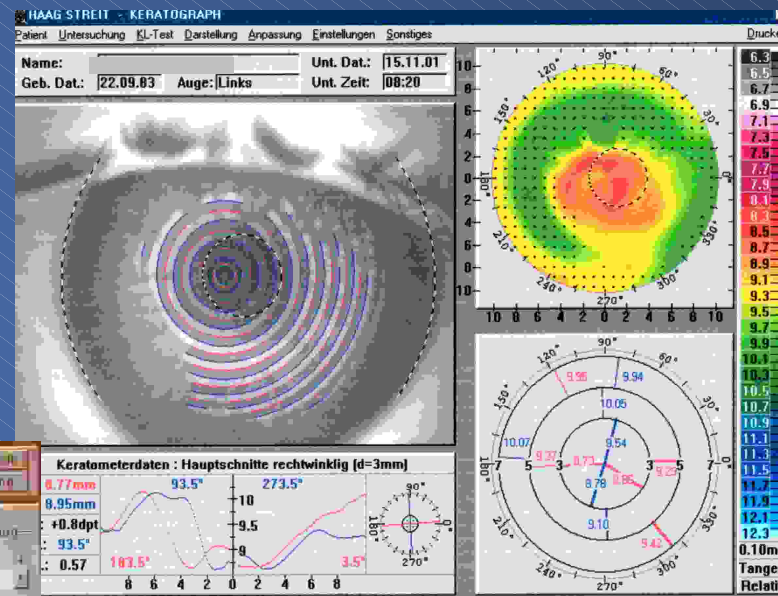
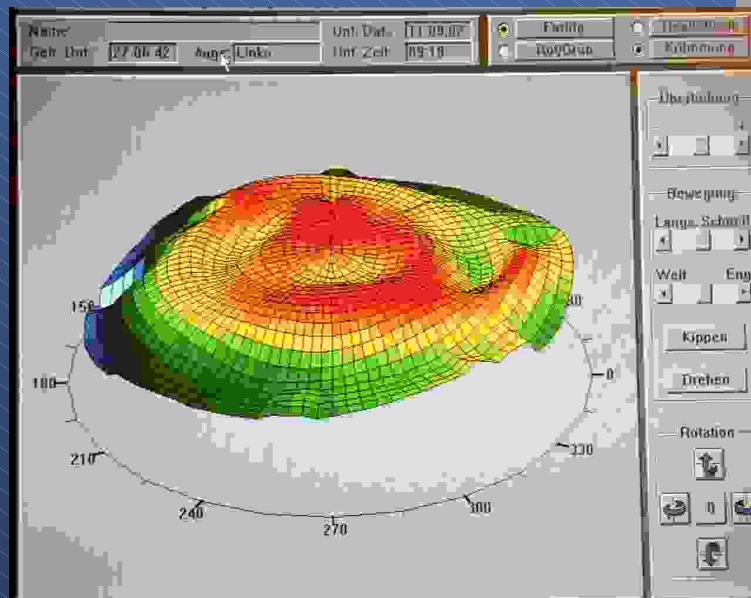


Irreguläre Astigmatismen ??



Kontra-Indikationen

Hornhautgeometrie :
Dezentrierte
Appexlagen



Zu starke Differenzen
der peripheren Abflachung



Kontra-Indikationen

Grosse skotopische Pupillen



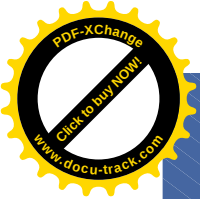
Anpass Technik

Welche Linse wähle ich denn ?

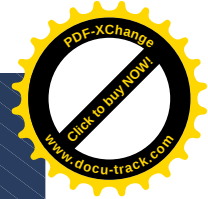


Bern 1996





Anpass Technik



Besuchen Sie unbedingt ein Anpassseminar über

Ortho-K bei Ihrem Hersteller des Vertrauens !

Passen Sie vorher keinesfalls OK Linsen an !

Die sonst zu erwartenden Misserfolge frustrieren

nicht nur Sie sondern auch Ihre Kunden.

Negativwerbung kann sich niemand leisten.



Anpass-Technik

Berechnungsassistent

Berechnung für FOK

(Falco Ortho Keratologie KL)

Grundwerte

Grundradius	7,38
Mittlere nE	0,56
Durchmesser	10,60

Korrektur (DPT)	-3,00
-----------------	-------

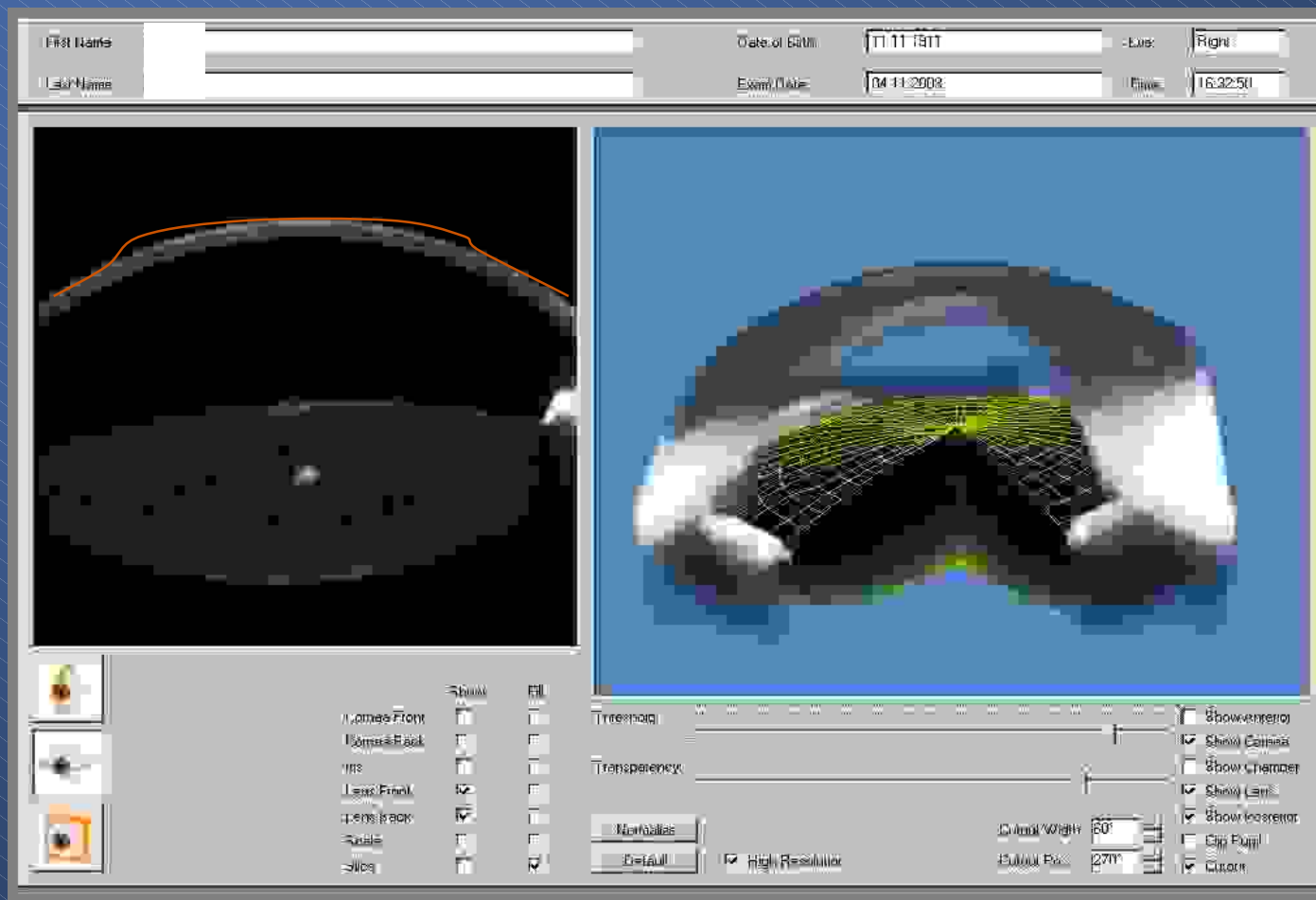
Korrekturfaktor	-0,75
-----------------	-------

Bestellwerte

Grundradius	7,38
Mittlere nE	0,56
Durchmesser	10,60
x-Wert	214
Korrekturradius	8,04



Anpass Technik



Anpass-Technik

Konventionelle Ortho-K Anpassung:



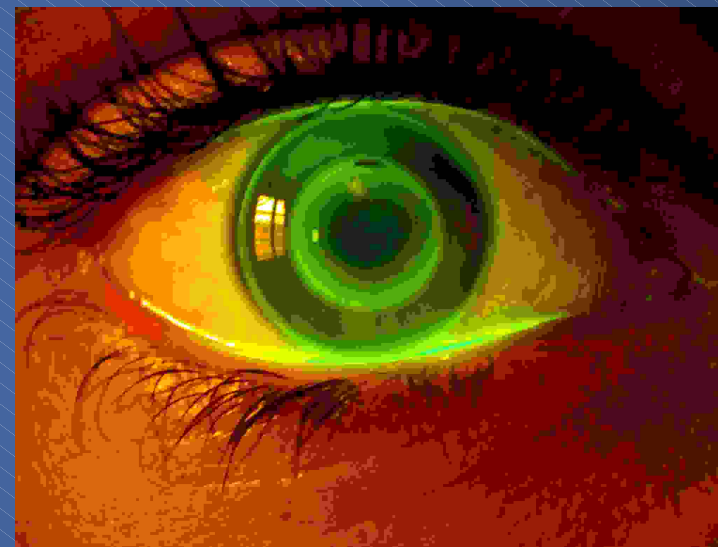
Design

Unterschiedliche Fluobilder von
„weicheren“ und „härteren“ Designs.



Langsamere „Onset“

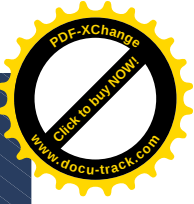
1. Nacht ca. 0,75 bis 1,0 dpt



Schnellerer „Onset“

1. Nacht ca. 1,25 bis 1,75 dpt





Die Herausforderung

Und nun zum echten Challenge !

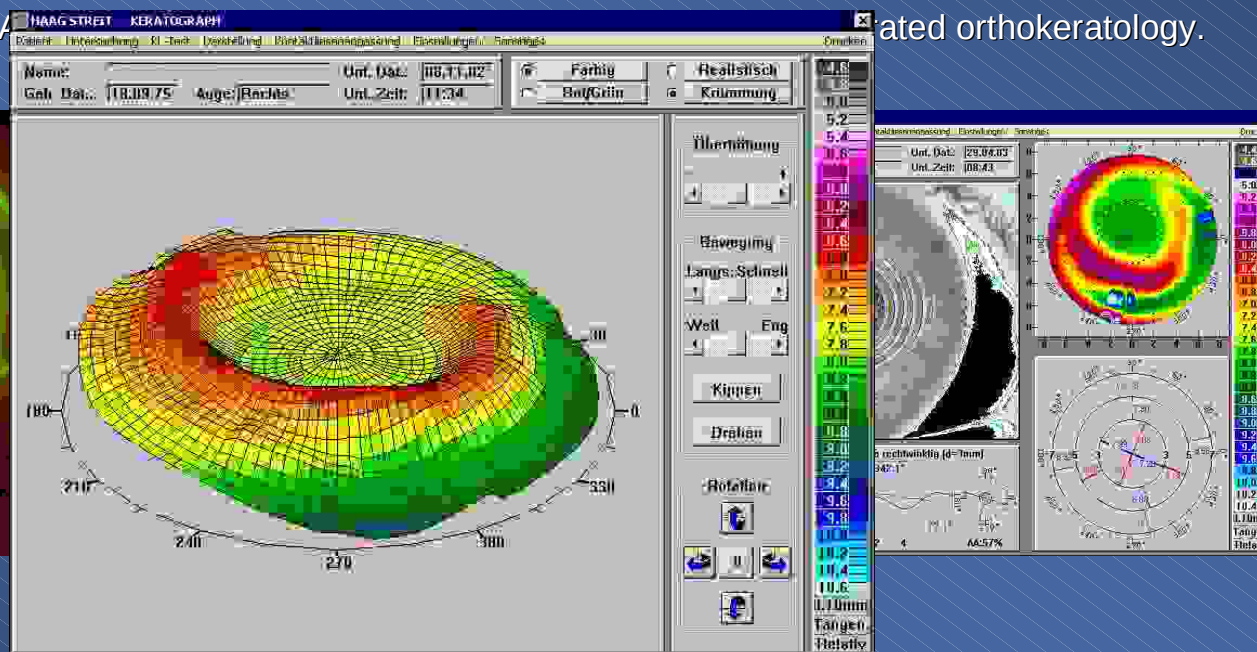
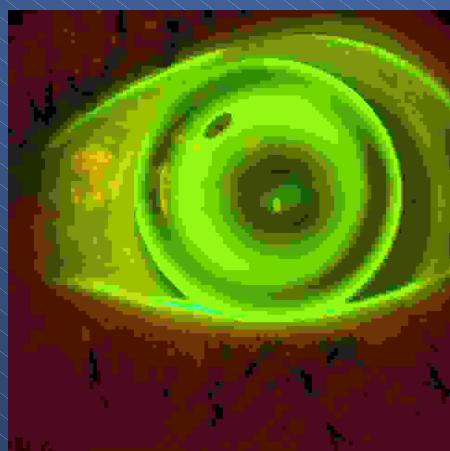
Astigmatismus



Was sagt die Literatur ?

„...., it reduces pre-existing astigmatism by an average of only 50 per cent and it does not do so reliably either for magnitude or direction. These results provide two useful patient selection criteria for orthokeratology. They are : assuming 0,50 to 0,75 D of astigmatism is a satisfactory outcome, orthokeratology can e expected to be successful for pre-fitting astigmatism of up to 1,00 D to 1,50 D; and the greater the pre-existing astigmatism, the less likely orthokeratology is to be successful.

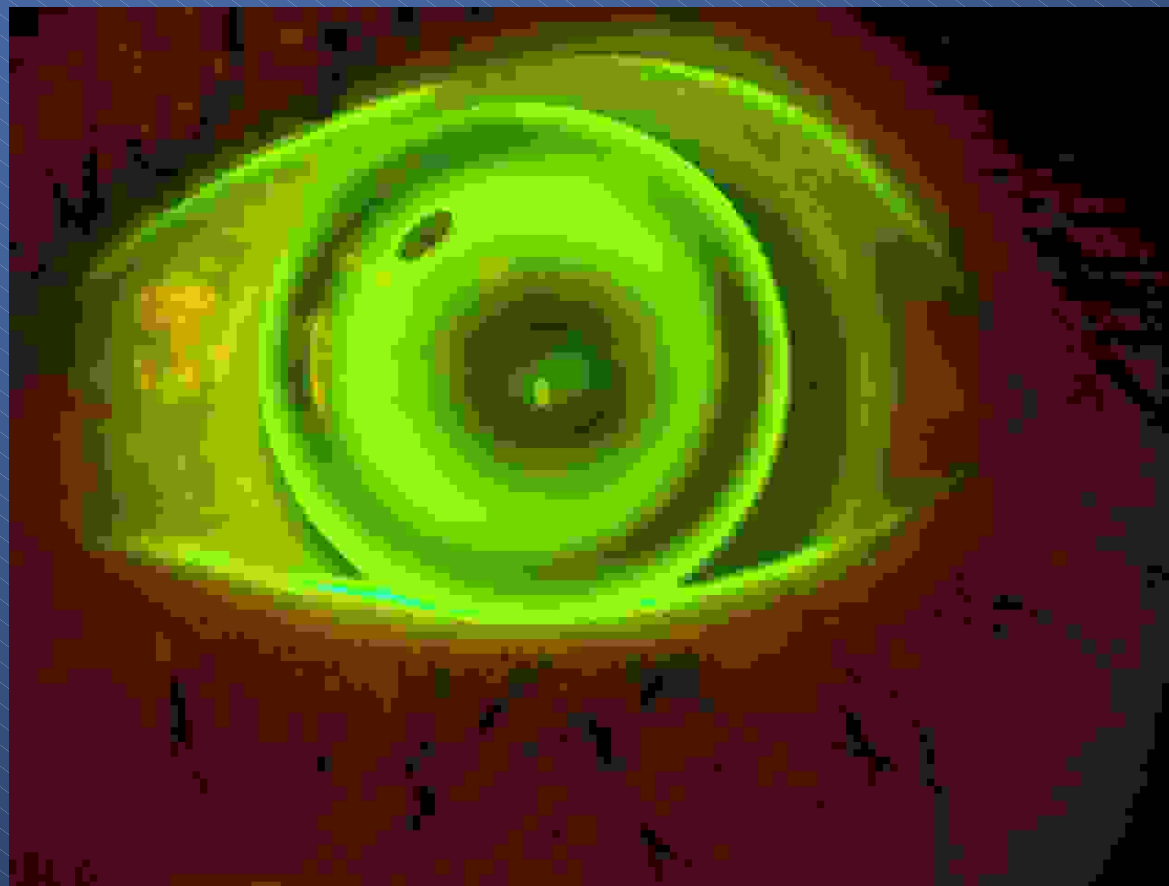
Mountford J, Pesudovs K : *Orthokeratology for myopia and astigmatism*. 2004. 100-110. *Journal of Refractive Medicine and Practice*.



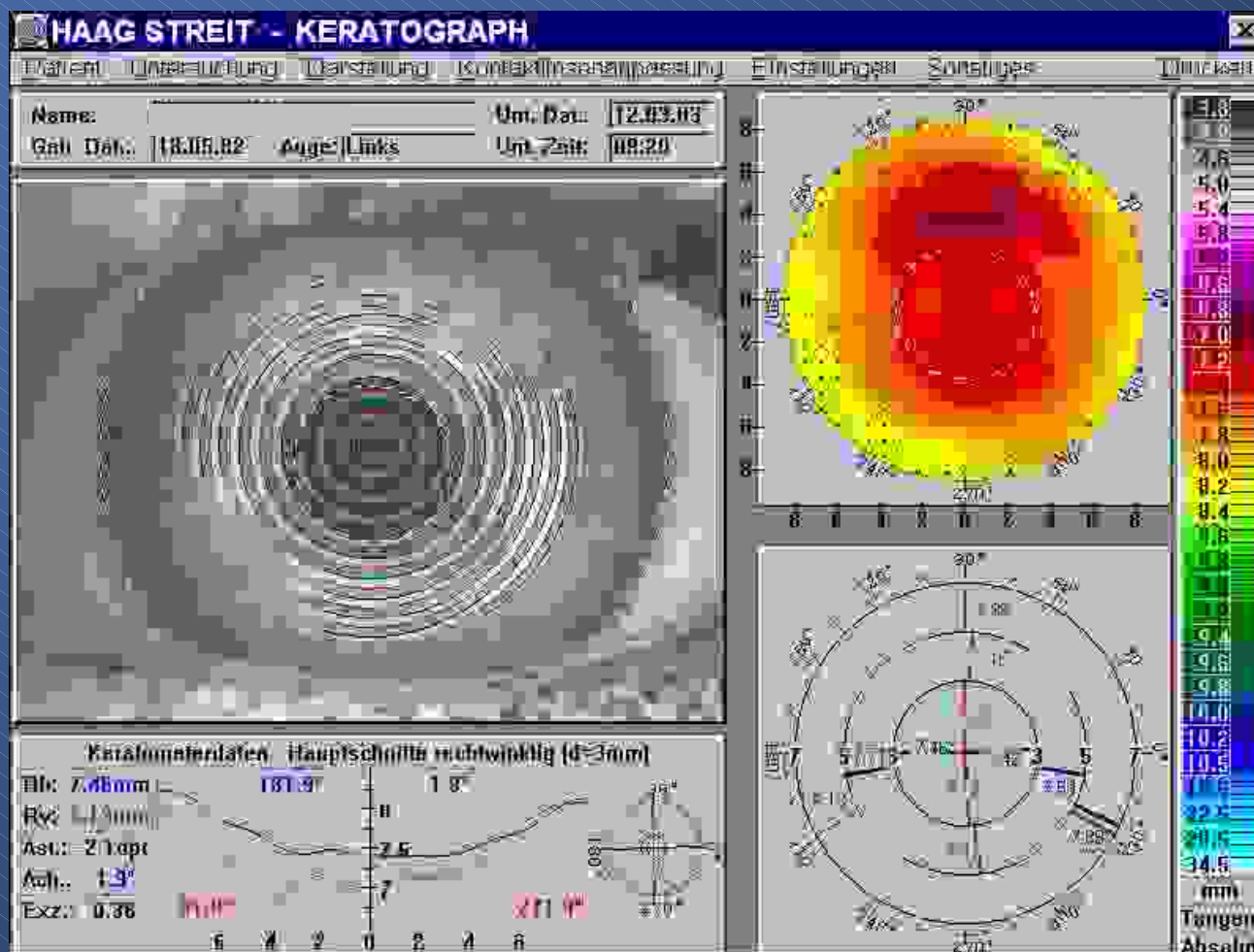
Moderne beschleunigte Orthokeratologie **war** limitiert für
Hornhautastigmatismus < 1,50 D



Unlösbar! ?



Torische FOKX



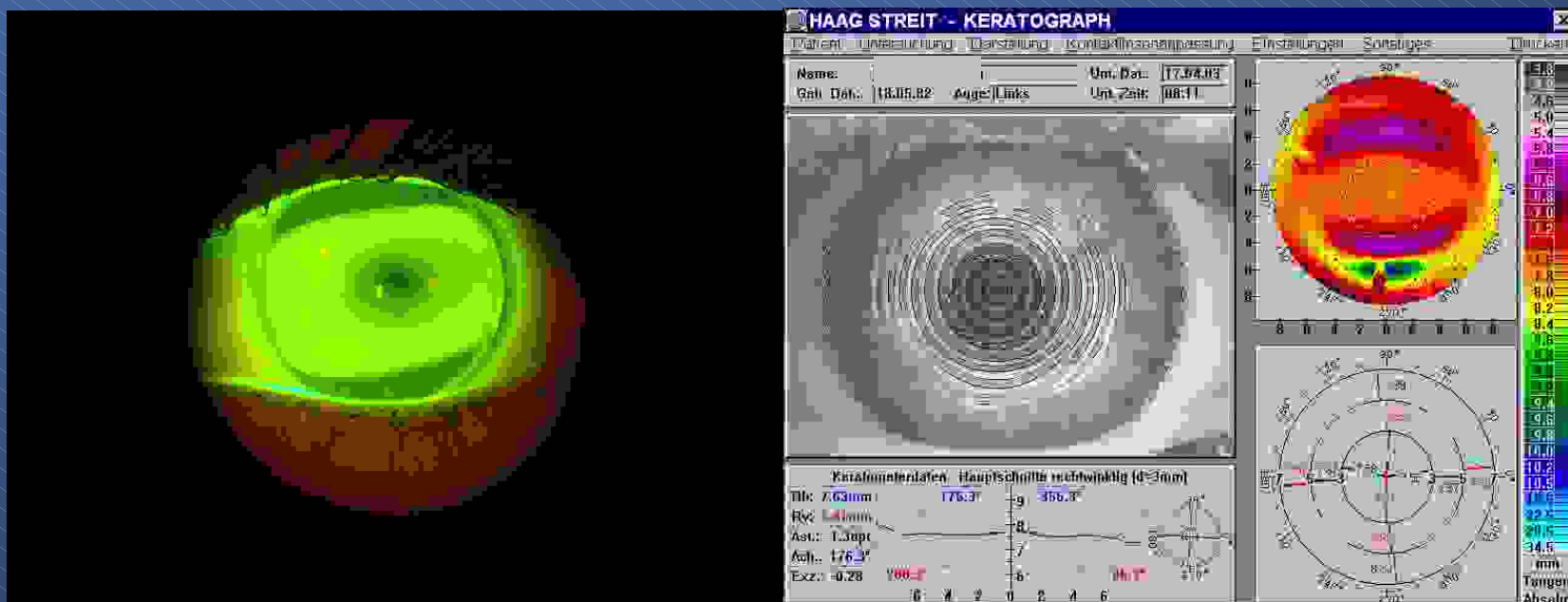
Astigmatism : -2,1 D rectus





Torische FOKX 1. Prototyp

Sphero-torische OK – fsa



1 Tag : -1,5 dpt

(HH -2,1 dpt)

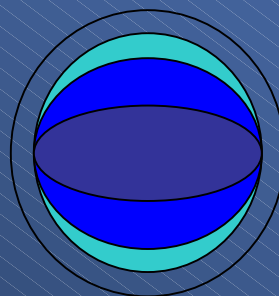
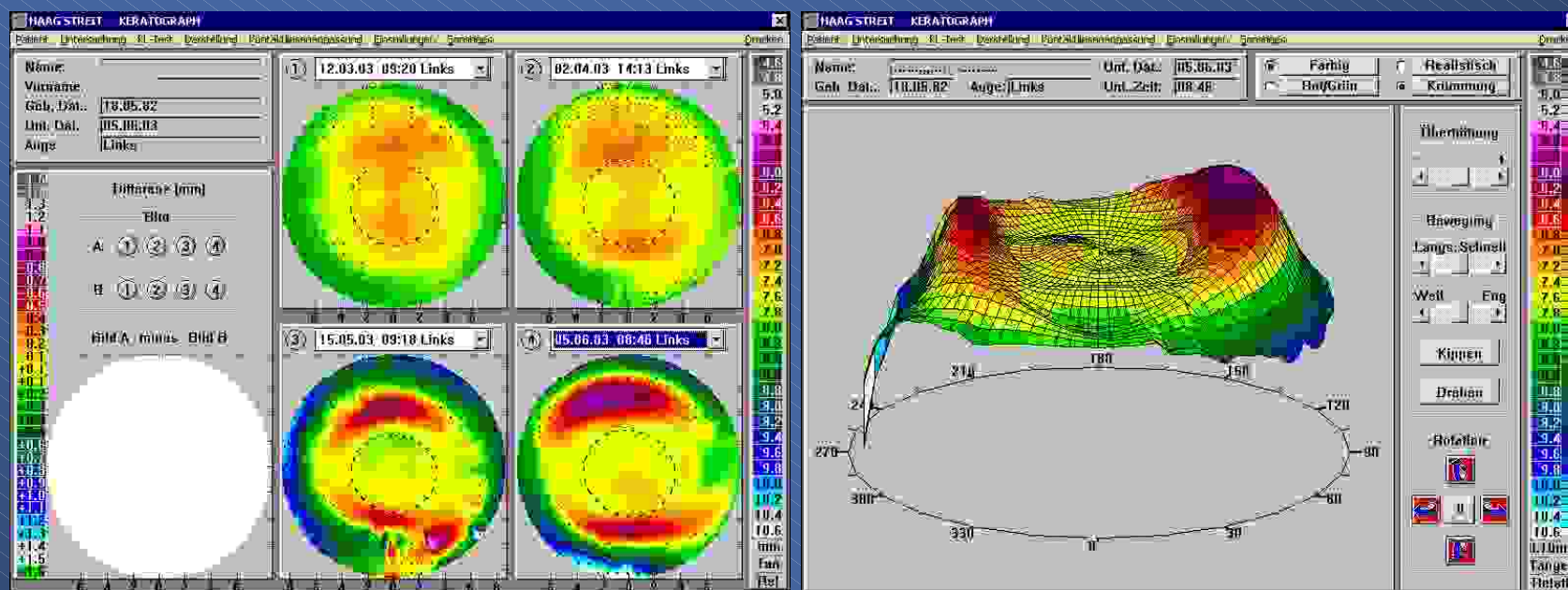
6 Wochen : - 0,5 dpt

(HH -1,3 dpt)



Torische FOKX

Sphero-torische OK – fsa



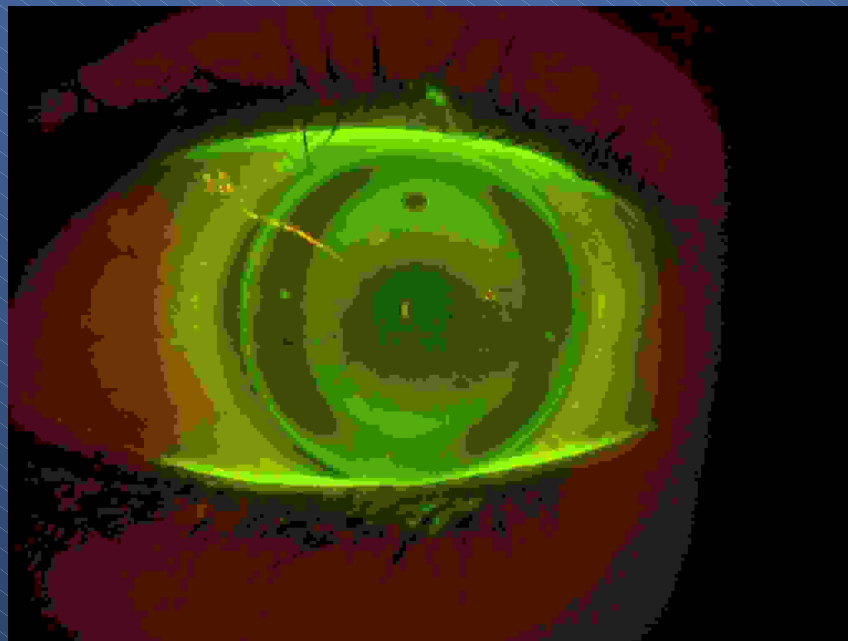
Central optic zone
Toric reverse zone
Alignment zone
Bevel



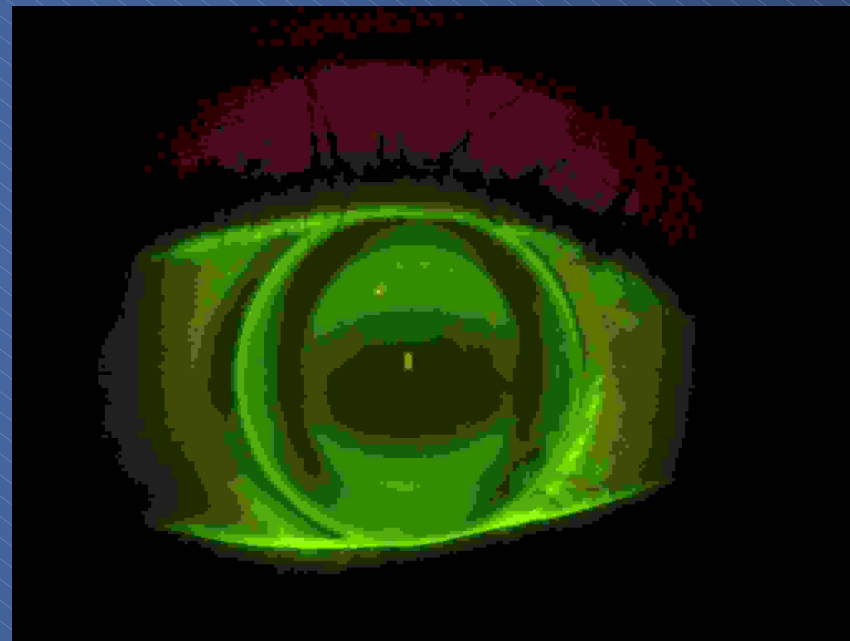
4-curve, peripheral-toric reverse design (Baertschi-Falco OK toric = BFOK fsa 00/rev)



Torische FOKX aktuelle Geometrie



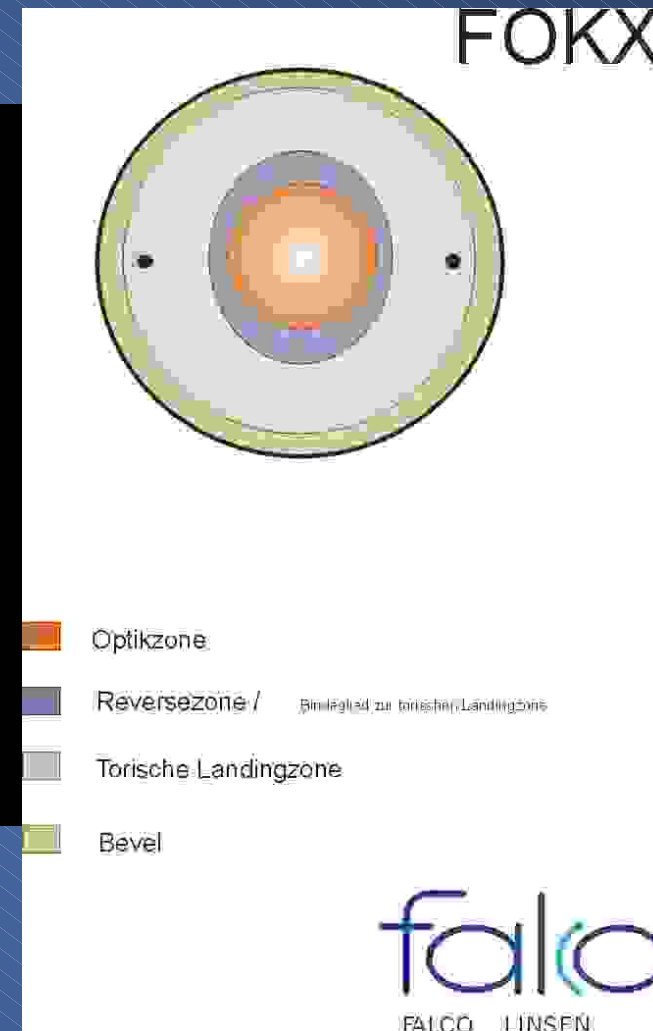
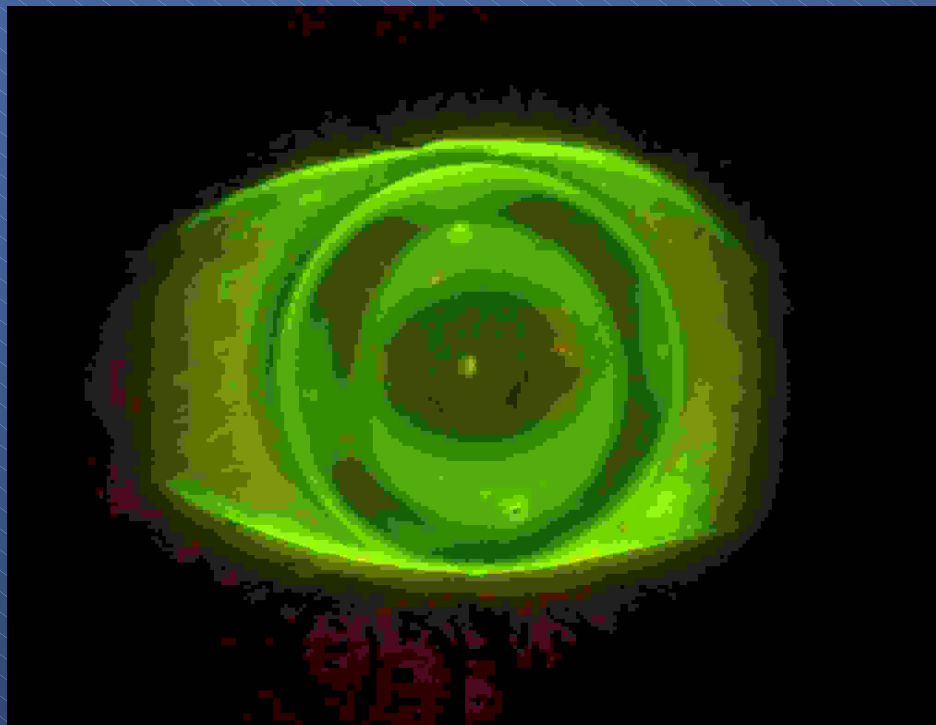
1. Tag $-0,25 -2,50 180^\circ$



6 Wochen $+ 0,25 -0,75 180^\circ$

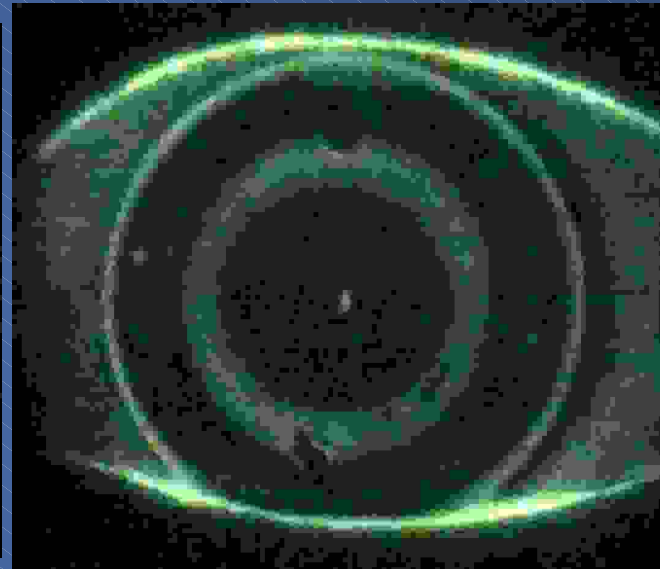
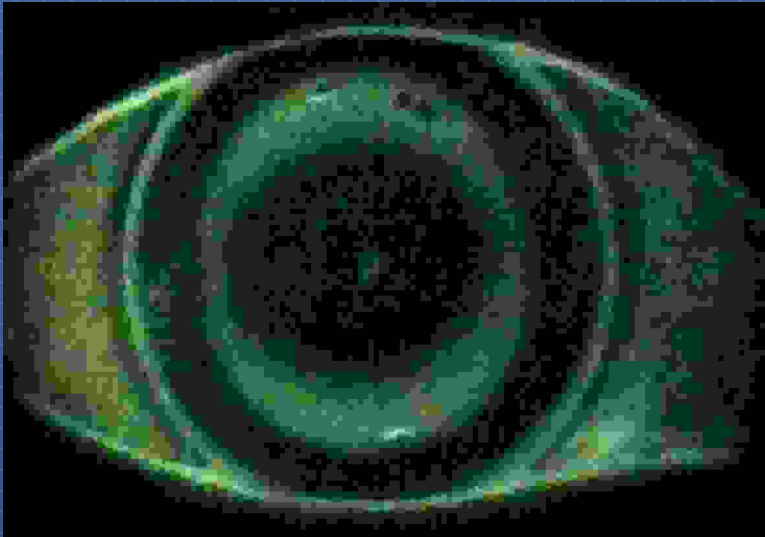


Torische FOKX





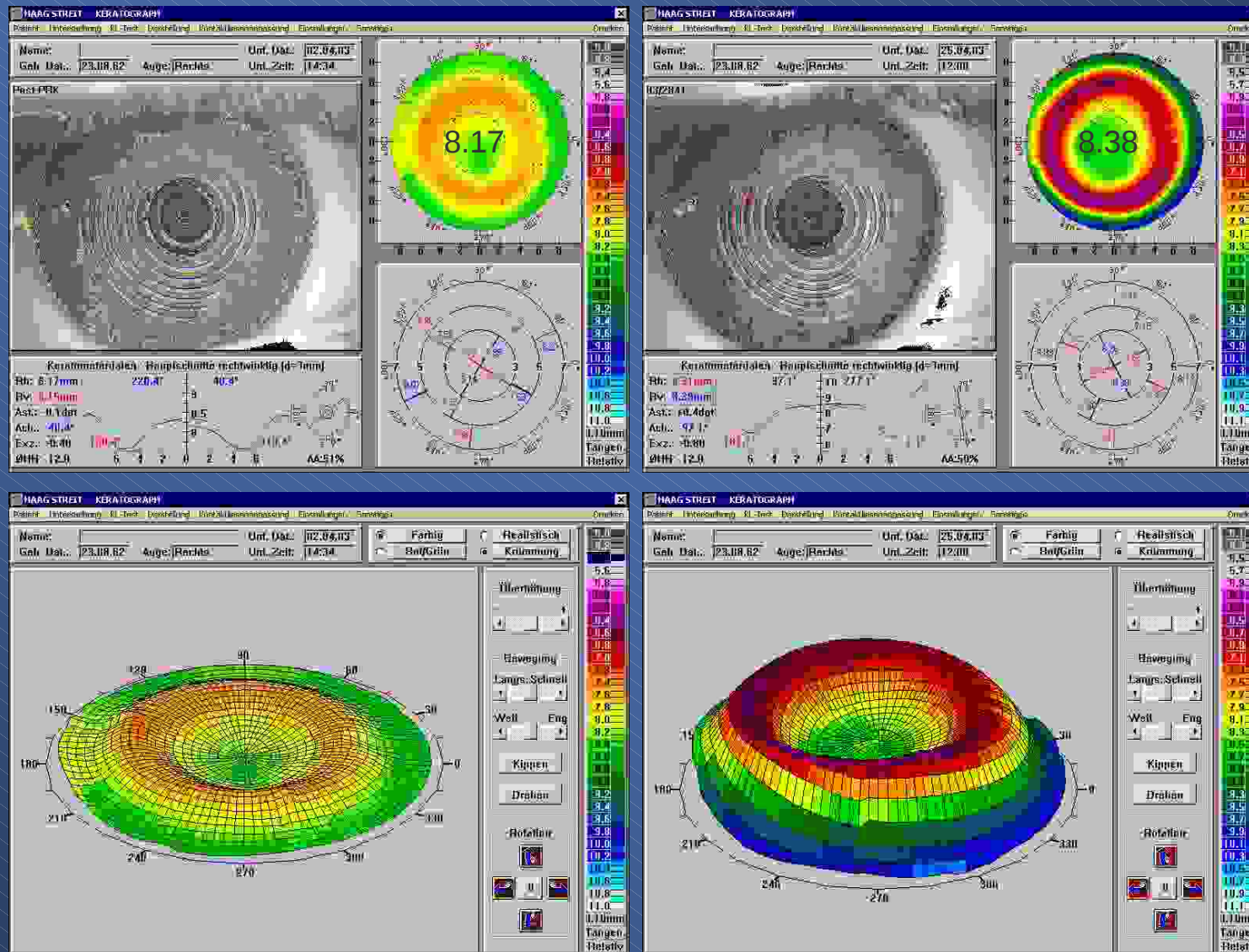
Torische FOKX



Anpassseminar demnächst bei FALCO



Ausblick Post-Lasik / Post-PRK



Trouble-Shooting

Jeder Hersteller wird Ihnen seine (erfolgreiche) Weise im Umgang mit OK Problemen erklären.

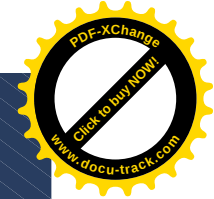
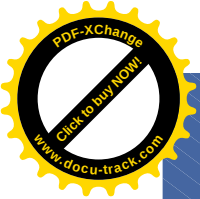
Wir sind alle verschieden !



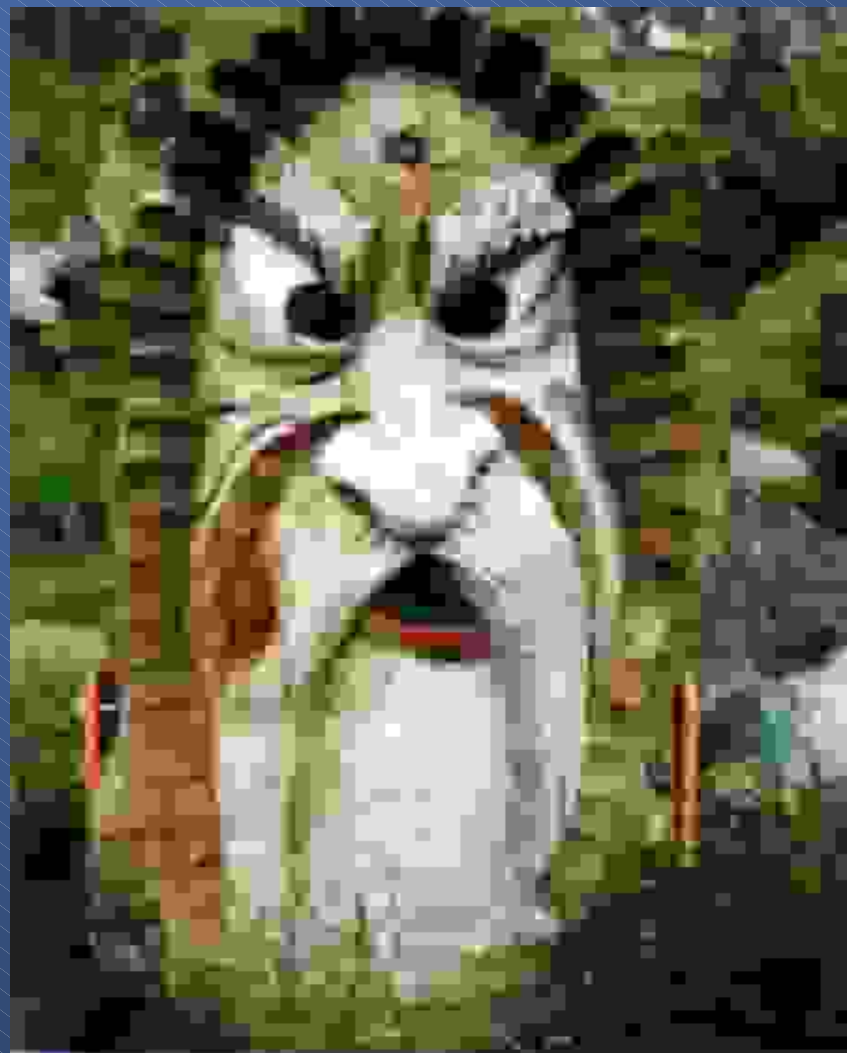
Trouble-Shooting

Enorm wichtig !



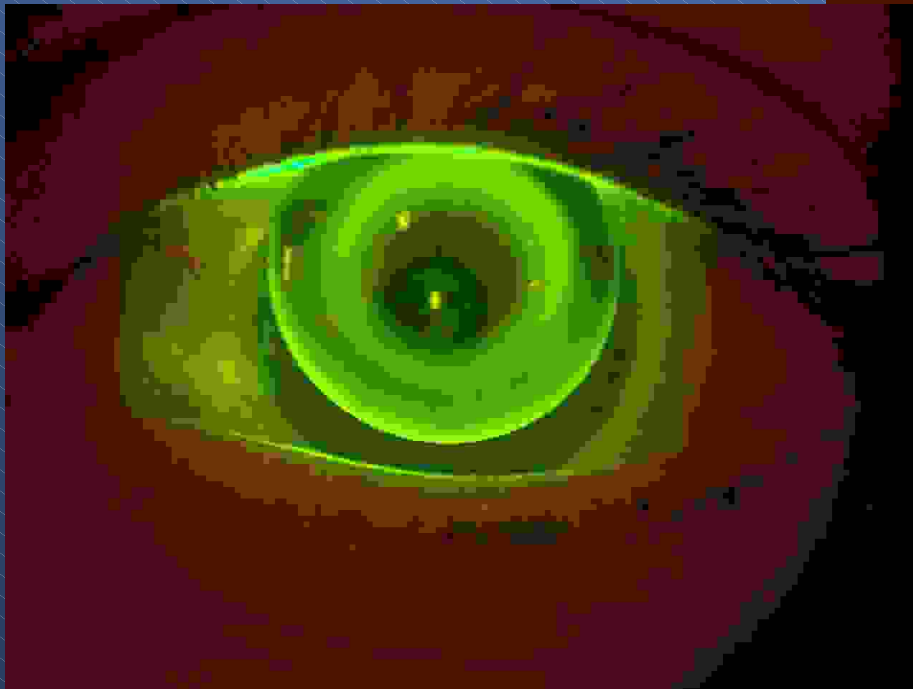
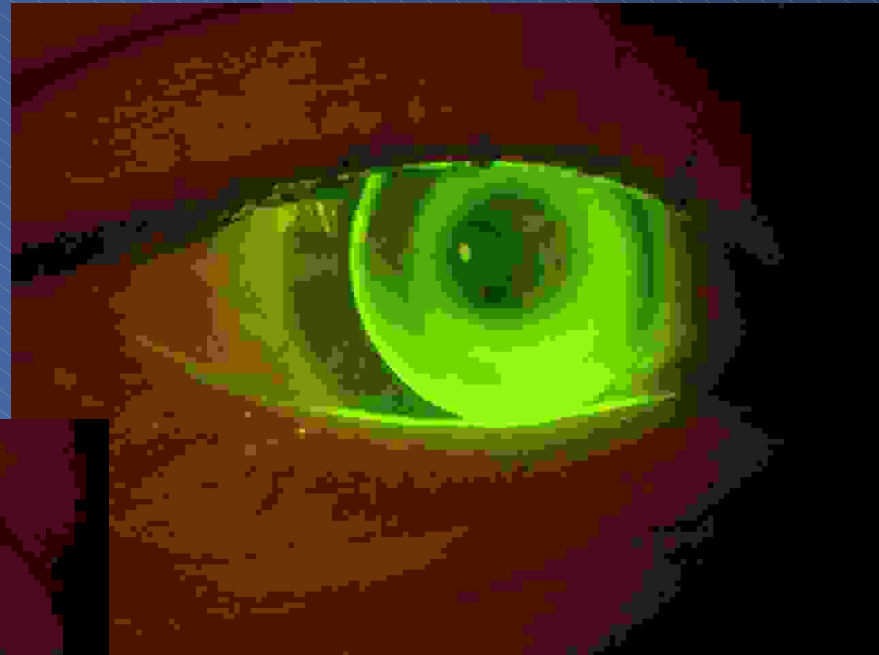


Troubles

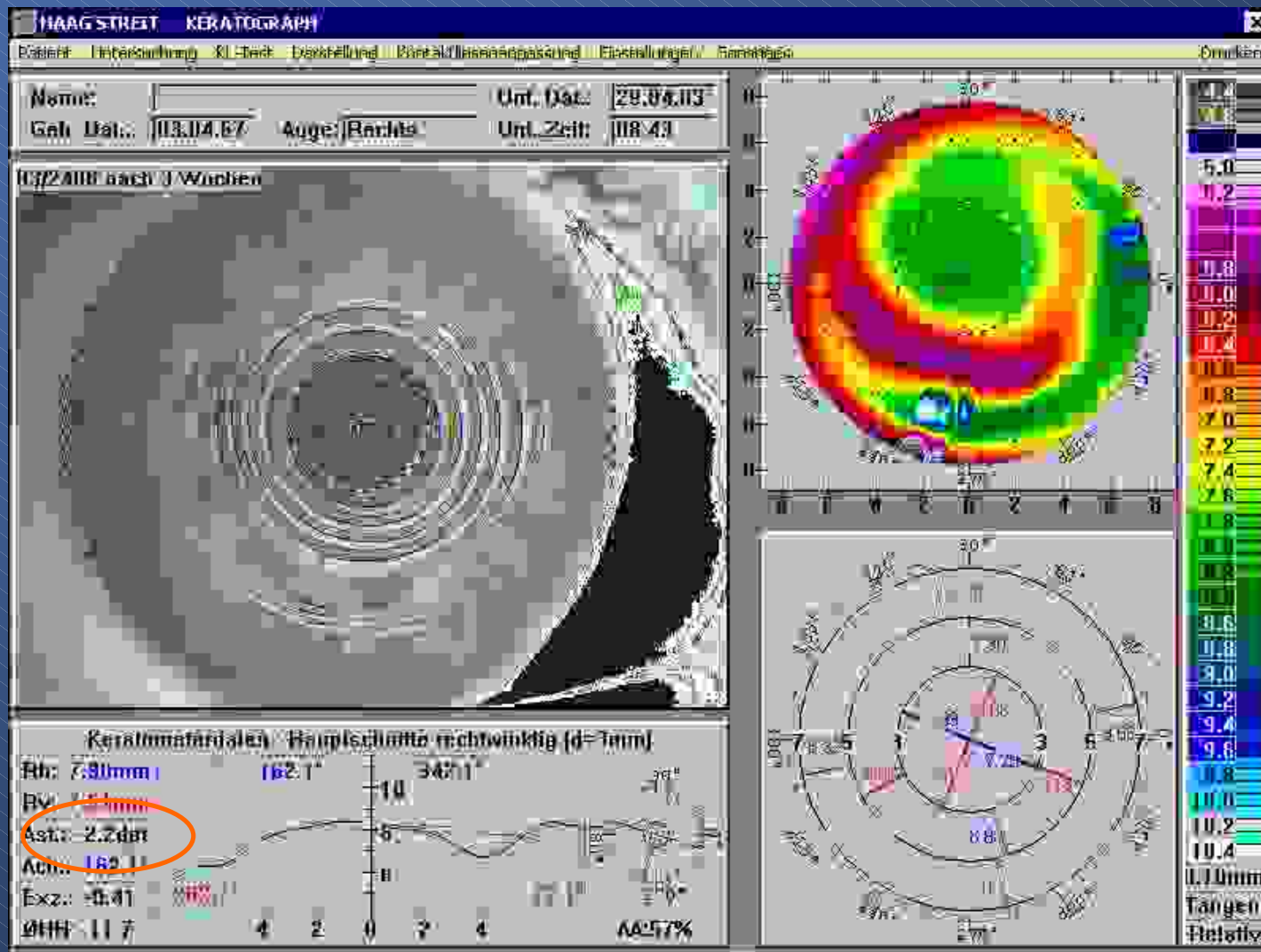


Troubles

Dezentrationen



Trouble Smily Face



FOK 8.30 +0.25 10.4 (7.50 0.50) x-Wert 203



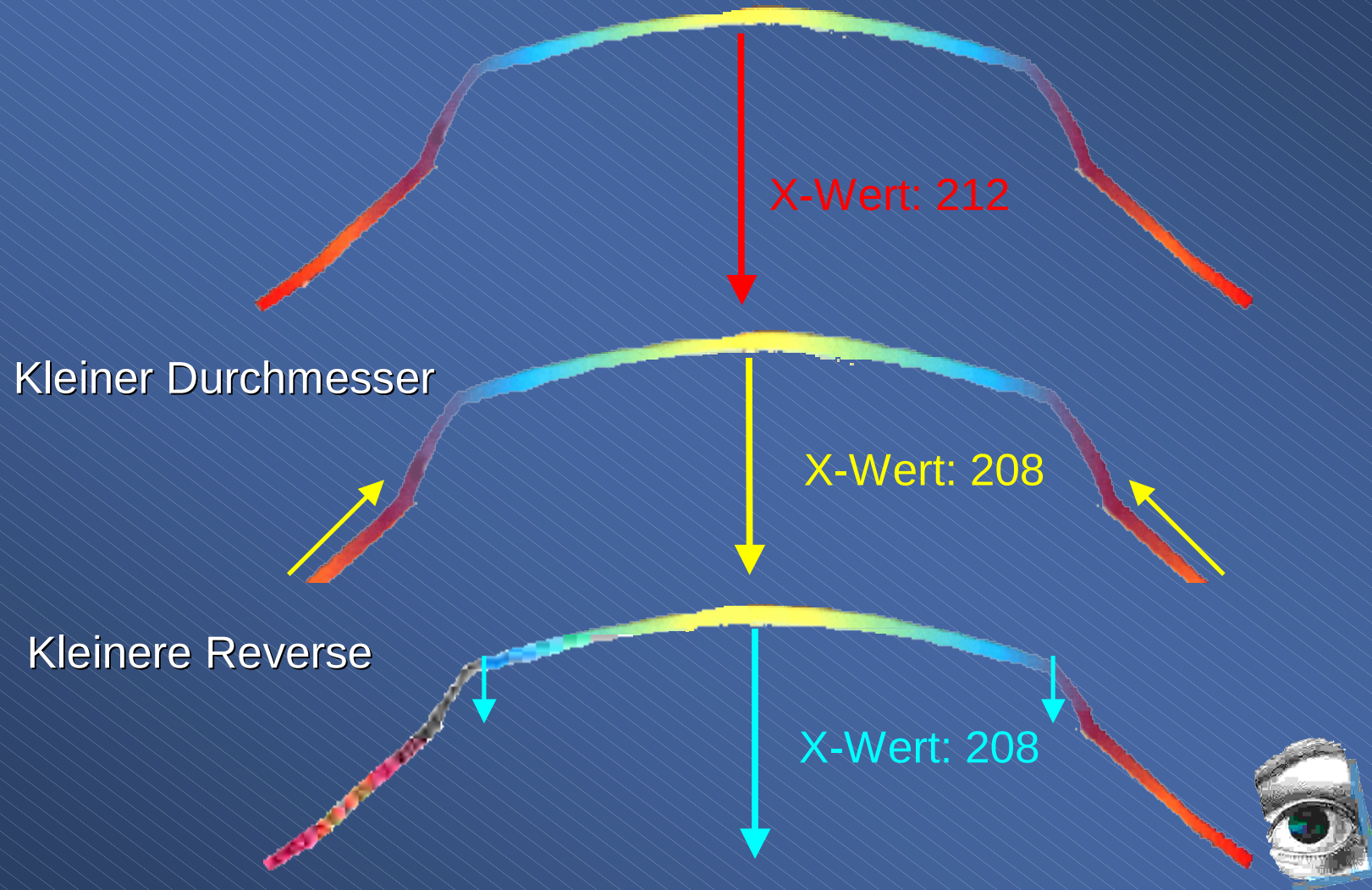
Trouble-Shooting

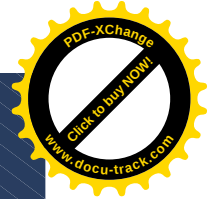
Na was würden Sie ändern ?

- Torische OK anpassen
- Alignment Zone überprüfen (zu steil ?)
- Gesamtdurchmesser vergrößern
- Prismenballast und 20 Minuten vor dem Schafen gehen einsetzen
- evt. Reverse zone / Scheiteltiefe geringer
- evt. IOZ reduzieren



Anpass-Technik



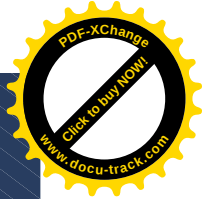


Trouble-Shooting

Na was würden Sie ändern ?

- Alignment Zone überprüfen (zu flach ?)
- Gesamtdurchmesser vergrössern
- evt. Reverse zone / Scheiteltiefe grösser
- evt. torische OK anpassen





HAAG-STREIT KERATOGRAPH

Patient: Interconching KL-Test: Verstellung Brechkraftmessung: Einschulung Fernnaht:

Name: Unt. Dat.: 07.11.02
 Geb. Dat.: 04.08.75 Auge: Rechts Unt. Zeit: 08:34

Keratometriedaten: Hauptachse rechtwinklig (d=7mm)

Rhc: 7.79mm 164.3° 344.3°
 Rv: 7.78mm
 Ast: 0.00dpt
 Ach: 164.3°
 Exz: 0.23
 QHH: 12.6 6 4 2 0 2 4 6 AA:70%

7.79

30° 0° 30° 60° 90° 120° 150° 180° 210° 240° 270° 300° 330°

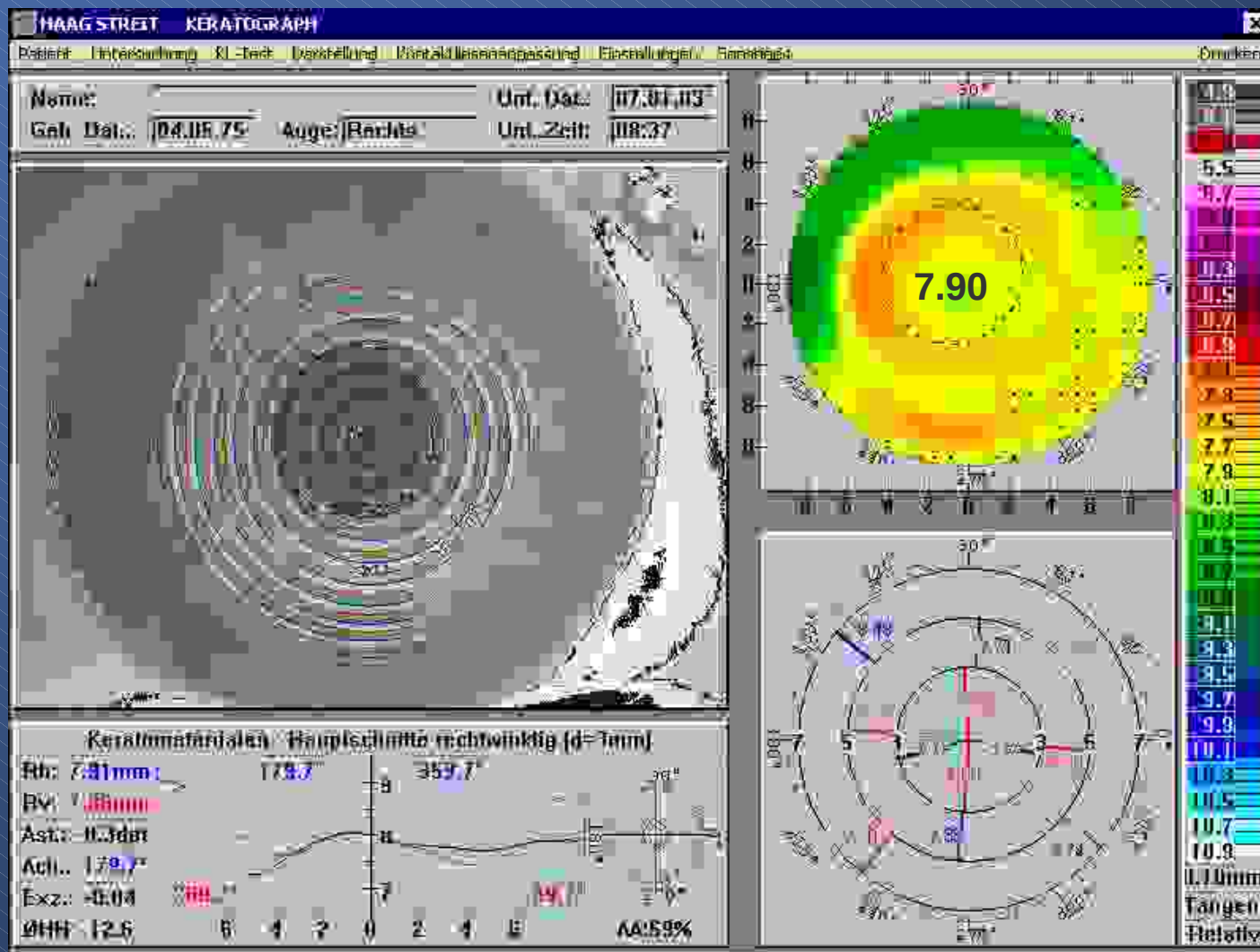
11.0
10.8
10.6
10.4
10.2
10.0
9.8
9.6
9.4
9.2
9.0
8.8
8.6
8.4
8.2
8.0
7.8
7.6
7.4
7.2
7.0

11.0mm
Tangen
Petiole

FIN DL 8.10 +0.12 10.8 (???) x-Wert: 209

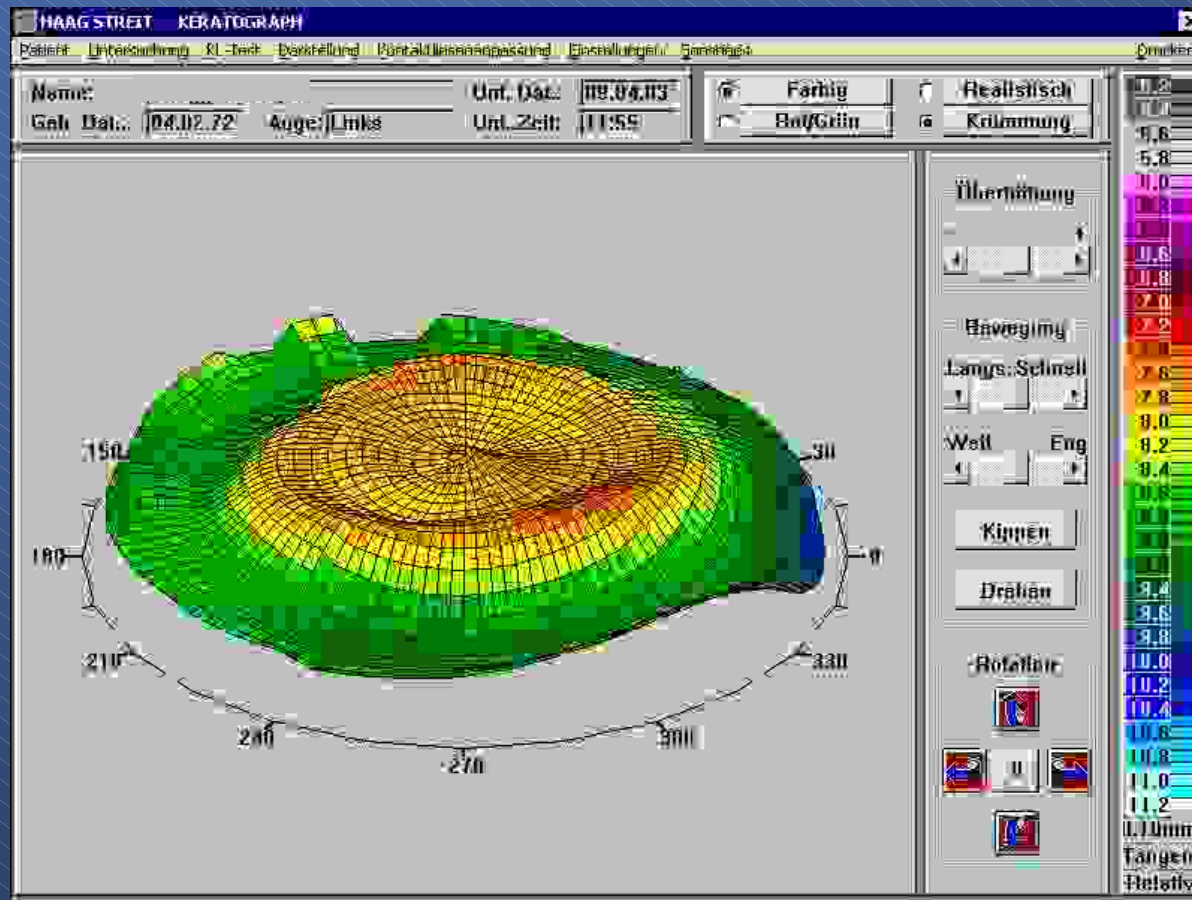


Trouble Korrektur „Insuffizienz“



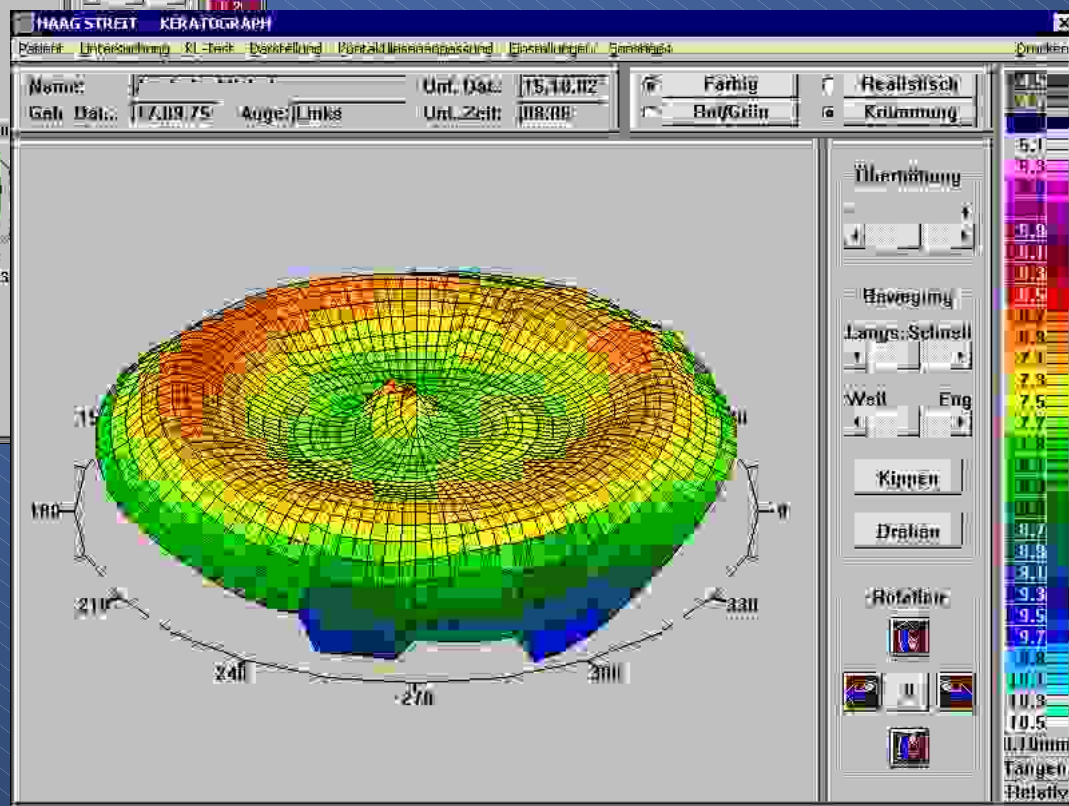
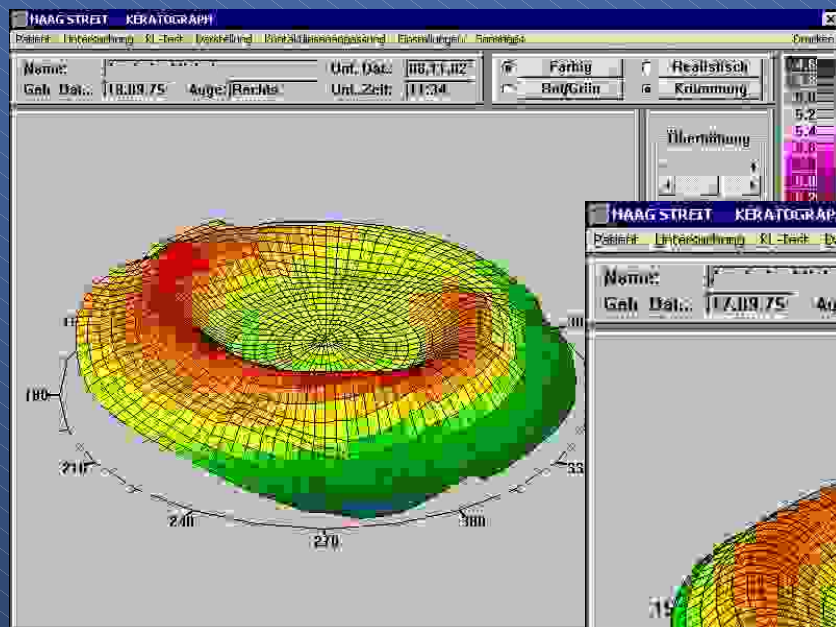
Trouble Korrektur „Insuffizienz“

Ziel nicht erreicht (va. bei langjährigen Linsenträger ?)



Komplikationen

„Ich sehe komisch“ (Central Island)



Trouble-Shooting

Na was würden Sie ändern ?

- Alignment Zone überprüfen (zu steil !)
- evt. Reverse zone / Scheiteltiefe geringer



Komplikationen

Stippungen



Trouble-Shooting

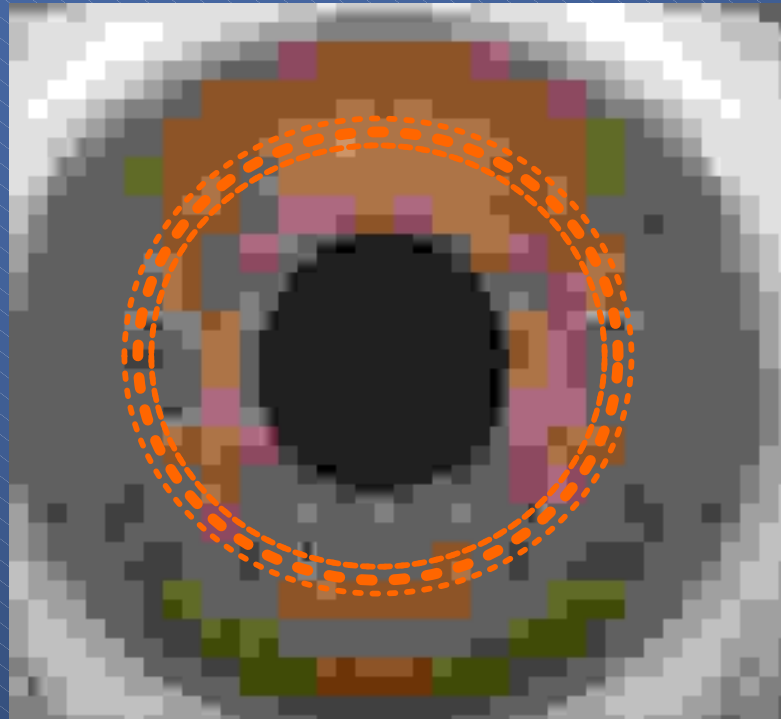
Na was würden Sie ändern ?

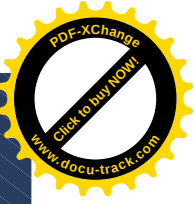
- Zentrale Auflage zu hart (Scheiteltiefe erhöhen)
- Ungenügend polierte IOZ
- Sitz zu eng / zu satt ? (Bevel ? Ventilation ?)



Komplikationen

Eisenring (Rah-Ring, Iron deposit ring)



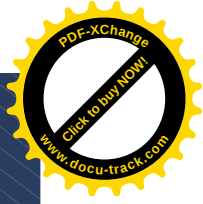


Trouble-Shooting

Na was würden Sie ändern ?

- Linsenkarenz





Schlussfolgerungen und Diskussion

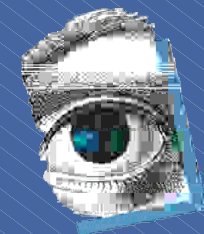
Ortho-Keratologie ist eine wissenschaftlich
erforschte, (meist) mathematisch berechenbare,
topographisch kontrollierbare und vollständig
reversible Korrekturmethode für schwache und
mittlere Kurzsichtigkeiten.



Schlussfolgerungen und Diskussion

Wissen was man tut,

und wie man es tut !





That's all folks!



Herzlichen Dank

