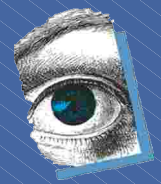
UNIVERSITÄTS-AUGENKLINIK BASEL

Torische Ortho-K

Kontaktlinsen

Falco Kontaktlinsen AG

M i c h a e l B ä r t s c h i
M.S.Optom., M.Med.Educ., F.A.A.O.
Kontaktlinsen-Studio Bärtschi und Universitäts Augenklinik Basel



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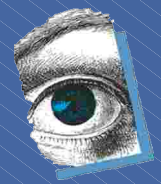
Spezifikationen Falco

Ermittlung der Bestelldaten :

- Aktuelle subjektive Brillenglasbestimmung
- Topographie (z.B. Oculus, CTK 922, Easygraph, usw.)
- Abklärung auf ungeeignete Umstände (Kontraindikationen)
- Daten in FALCO Berechnungsprogramm eingeben



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Spezifikationen Falco

Bestelldaten mittels FALCO OK Berechnungsprogramm ermitteln :

1) Daten eingeben

2) FOK Vorschlag

3) Bestellung

Das war's denn auch schon ;-)

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Spezifikationen Falco

Unterschiedliche Fluobilder von

„weicheren“, polierten und „härteren“, unpolierten Designs.

Langsamerer „Onset“

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

Schnellerer „Onset“

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

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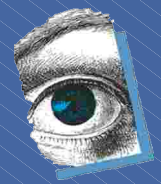
Spezifikationen Falco

So sieht es dann am Schluss aus :

Typ	Material	Korrekturrad.	dpt.	Durchm.	(Scheitelrad./ n.E.)	Scheiteltiefe
FOK	XO rot	9,25	+0,75	10,6	(8,09 / 0,52)	x = 192

Und nun zum echten Challenge !

Astigmatismus



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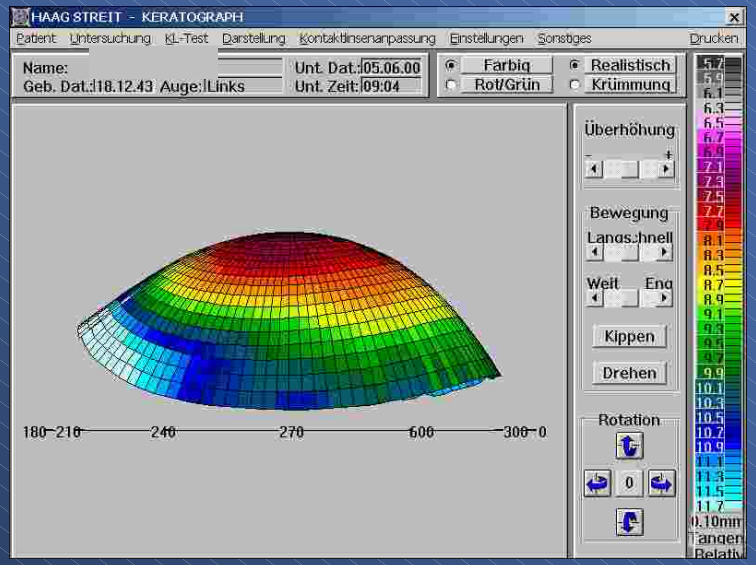
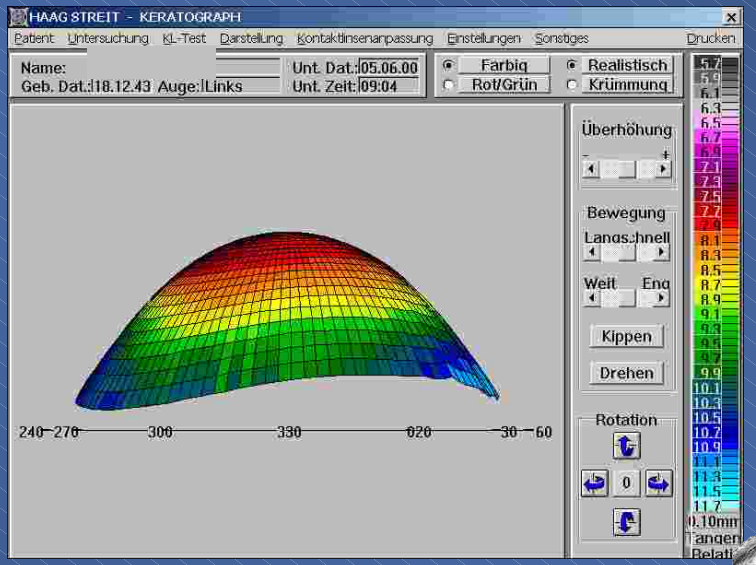
Definition

Regelmässiger Hornhaut Astigmatismus

Jeder Meridian ist definiert durch eine individuelle, regelmässige Krümmung, mit einem definierten Brennpunkt.





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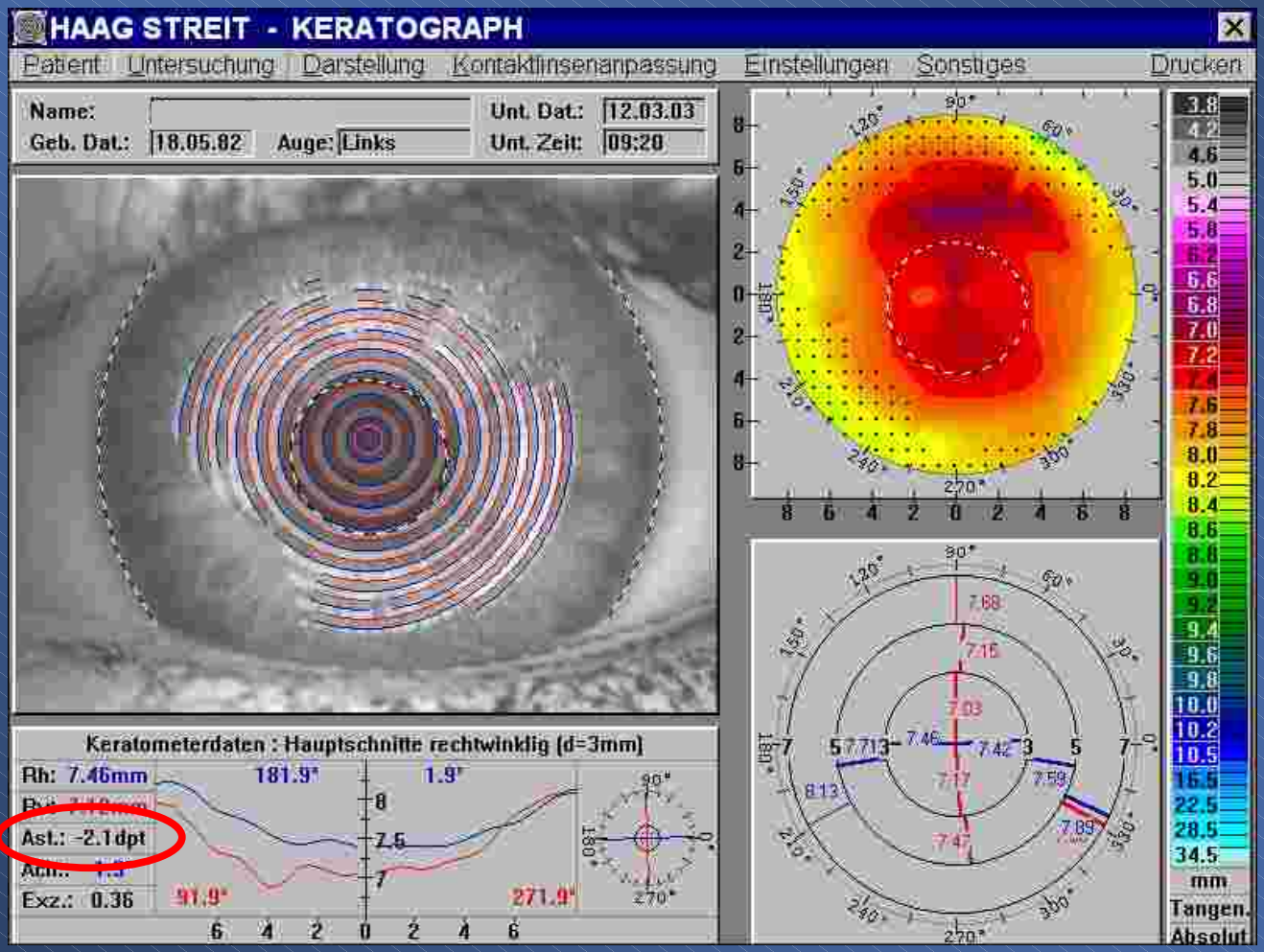
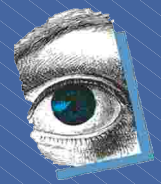
Challenging situations

Mittlerer regelmässiger Astigmatismus <2,5 dpt





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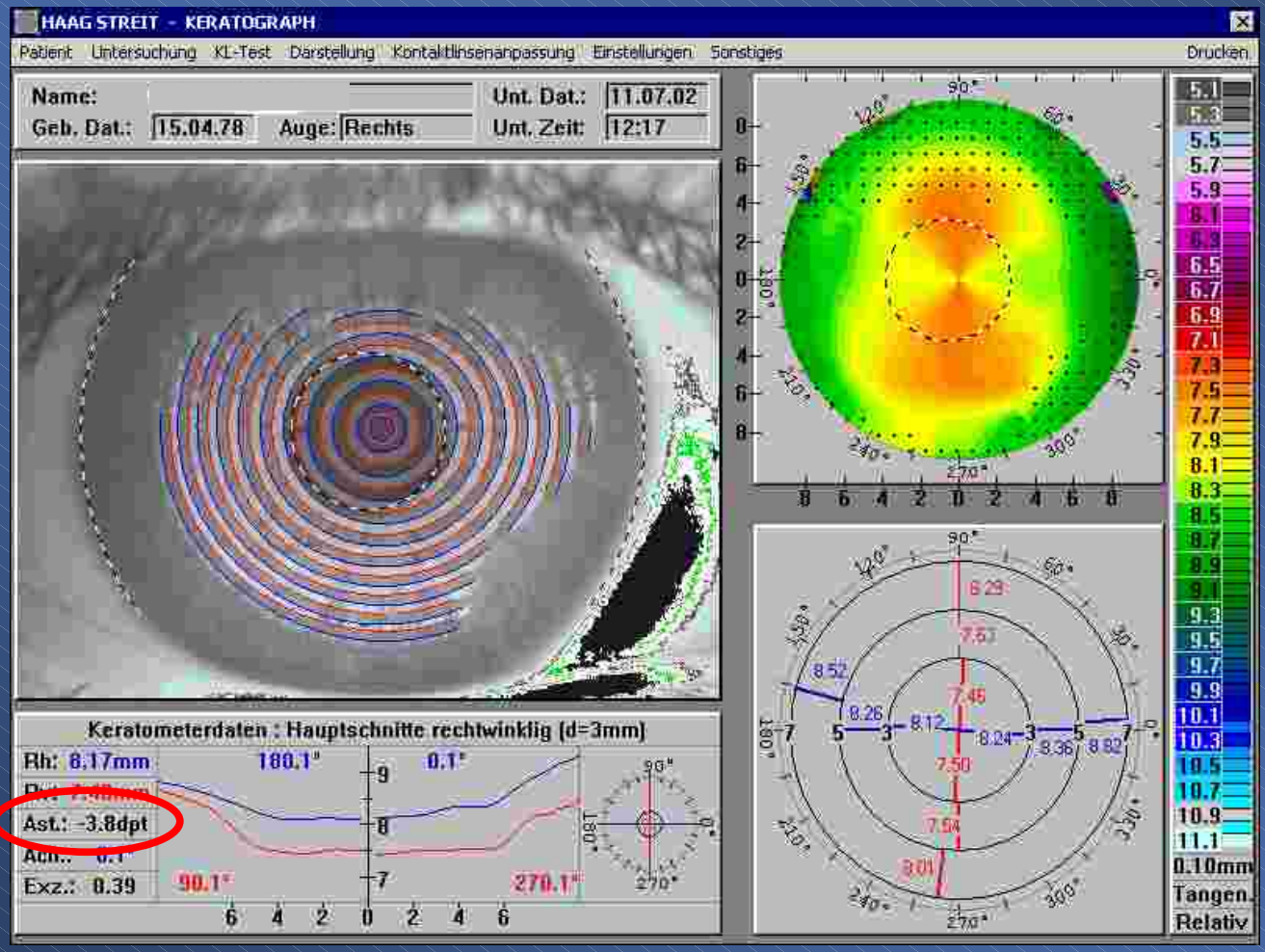
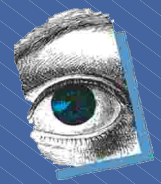
Challenging situations

Hoher regelmässiger Astigmatismus >2,5 dpt





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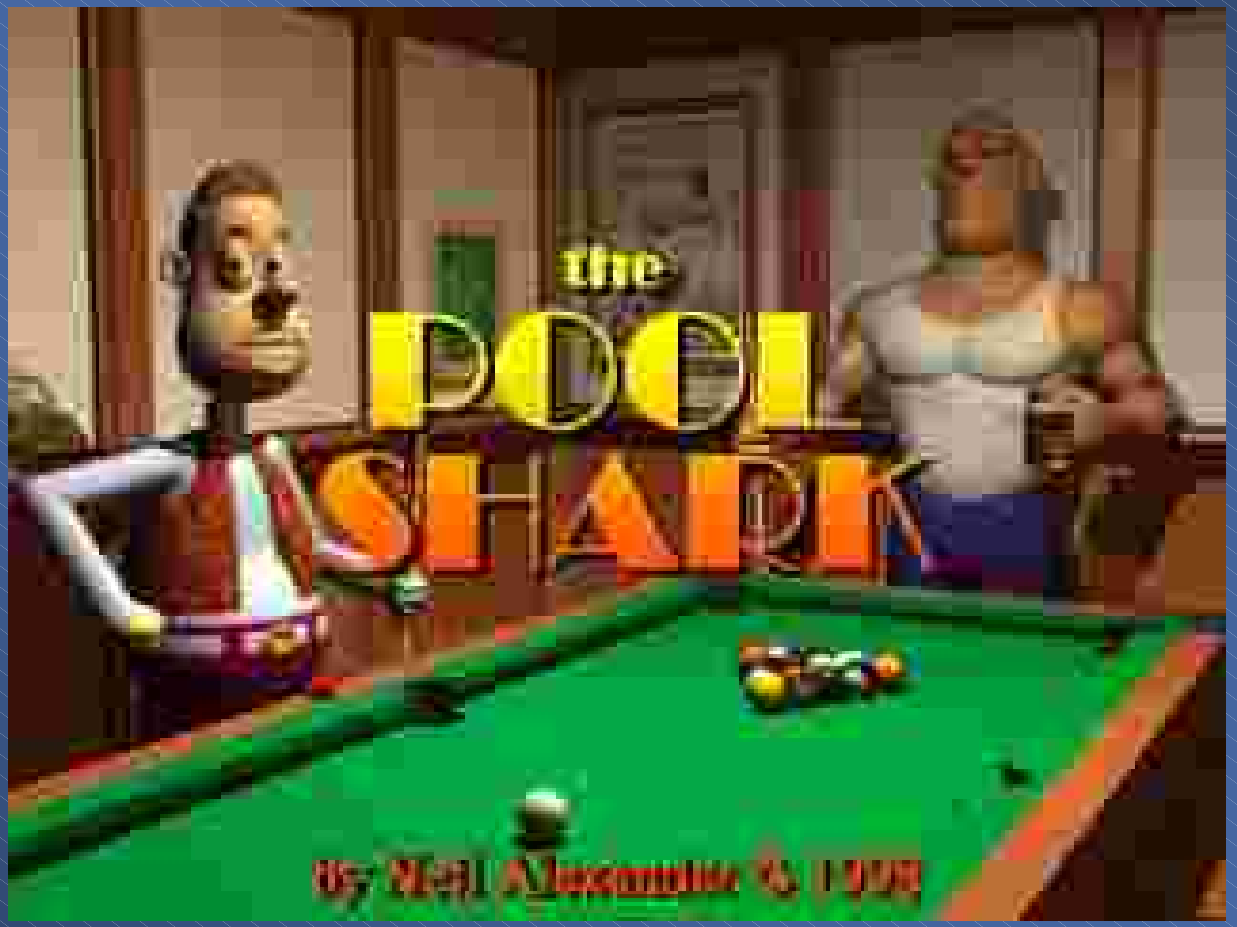
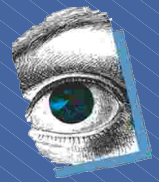
Anpass Technik





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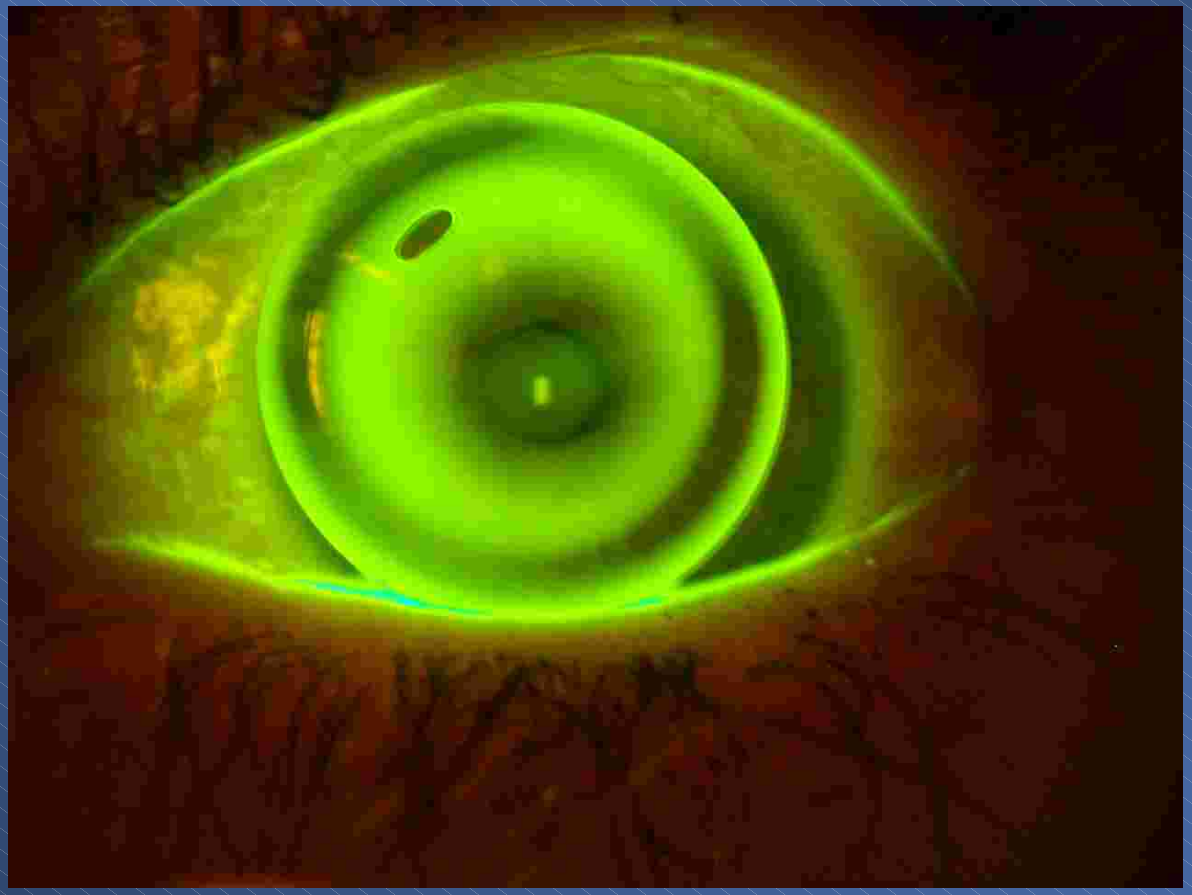
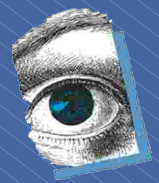
Unlösbar!?





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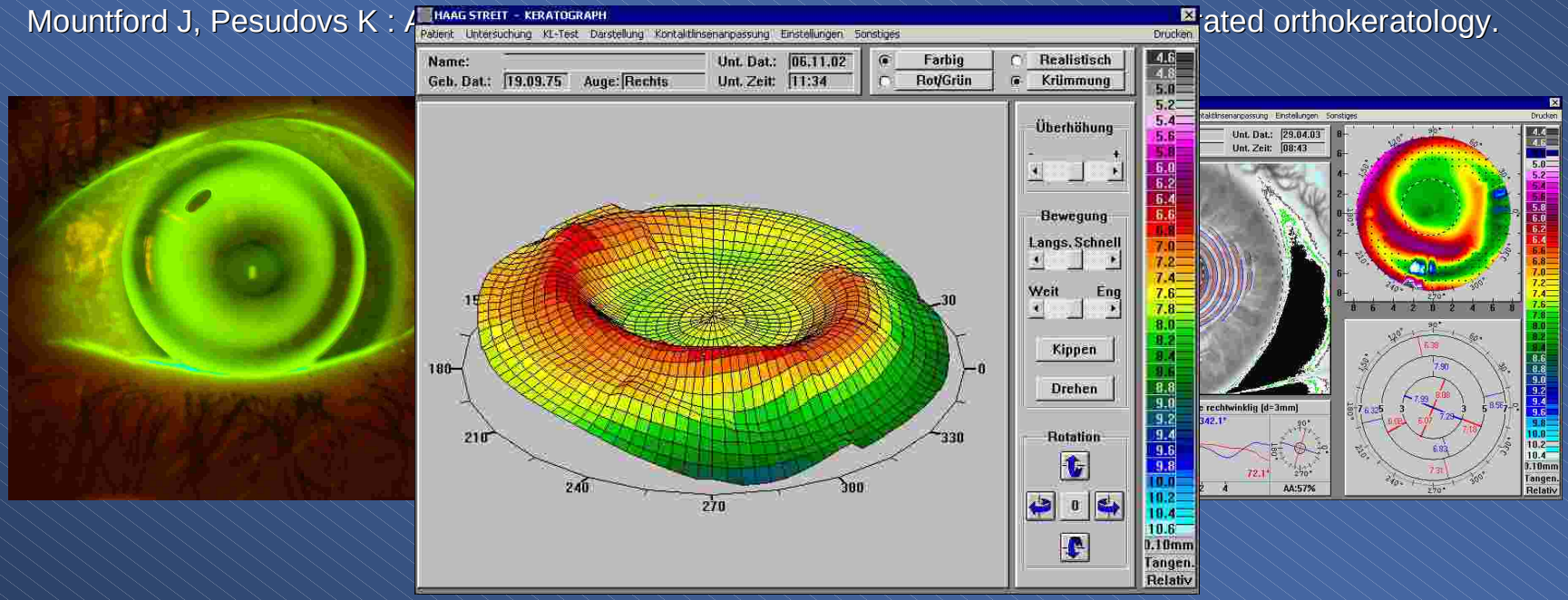
Was sagt die Literatur ?

„…, 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 : A…ated orthokeratology.



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

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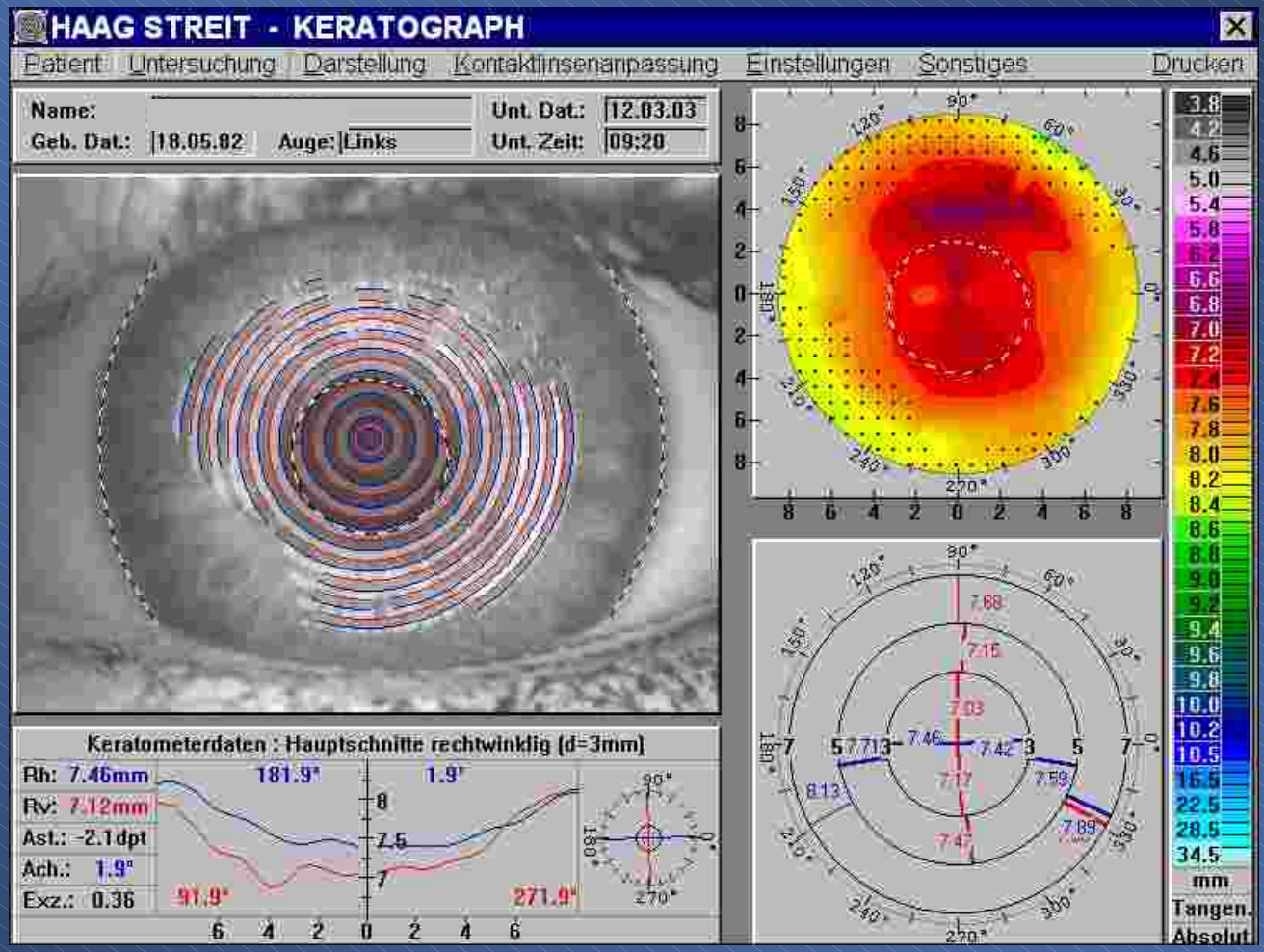
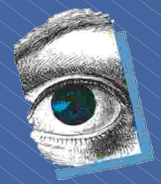
Torische FOKX



Astigmatism : -2,1 D rectus



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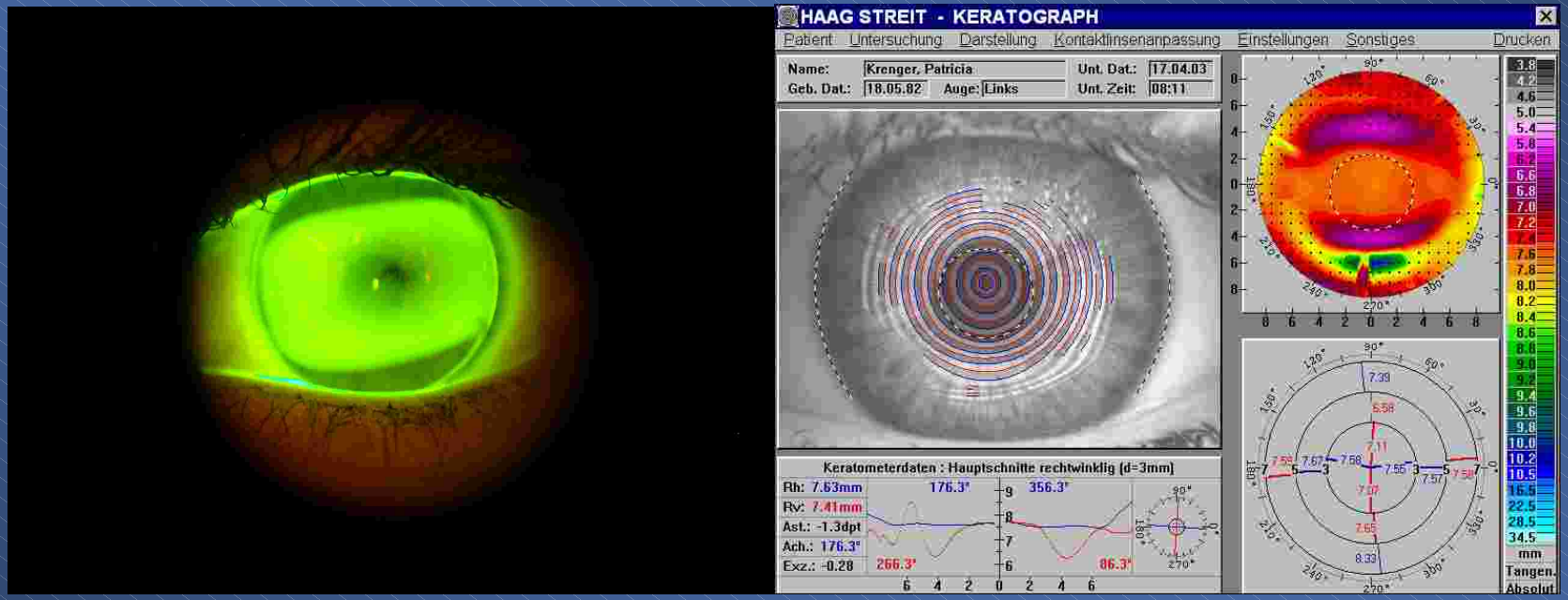
Torische FOKX 1. Prototyp

Sphero-torische OK – fsa



1 Tag : –1,5 dpt

(HH -2,1 dpt)

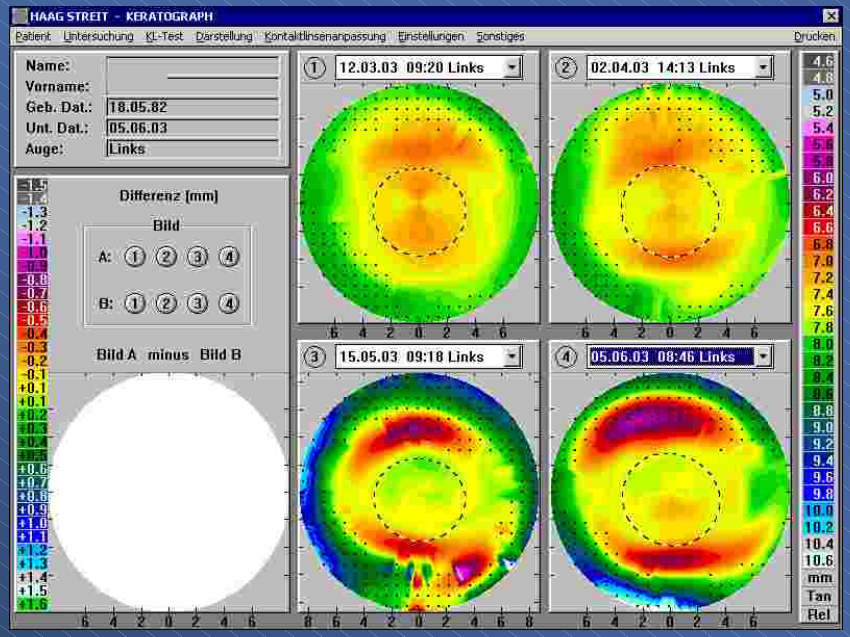
6 Wochen : - 0,5 dpt

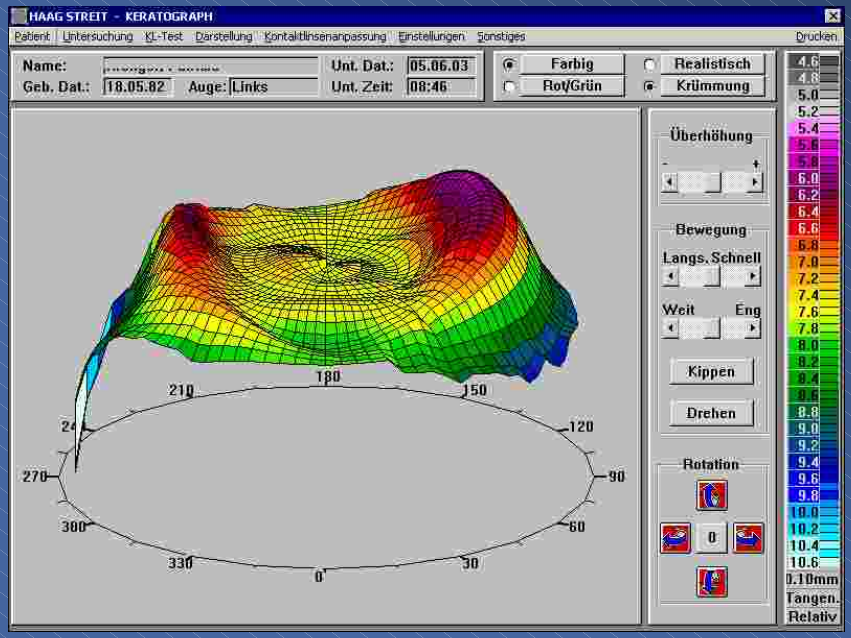
(HH -1,3 dpt)

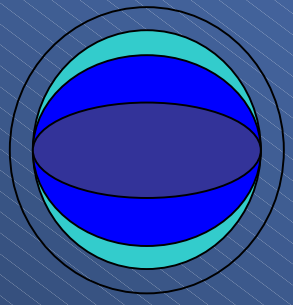
UNIVERSITÄTS-AUGENKLINIK BASEL

Torische FOKX

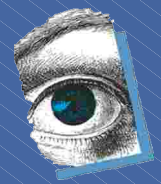
Sphero-torische OK – fsa







Central optic zone
Toric reverse zone
Alignment zone
Bevel



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

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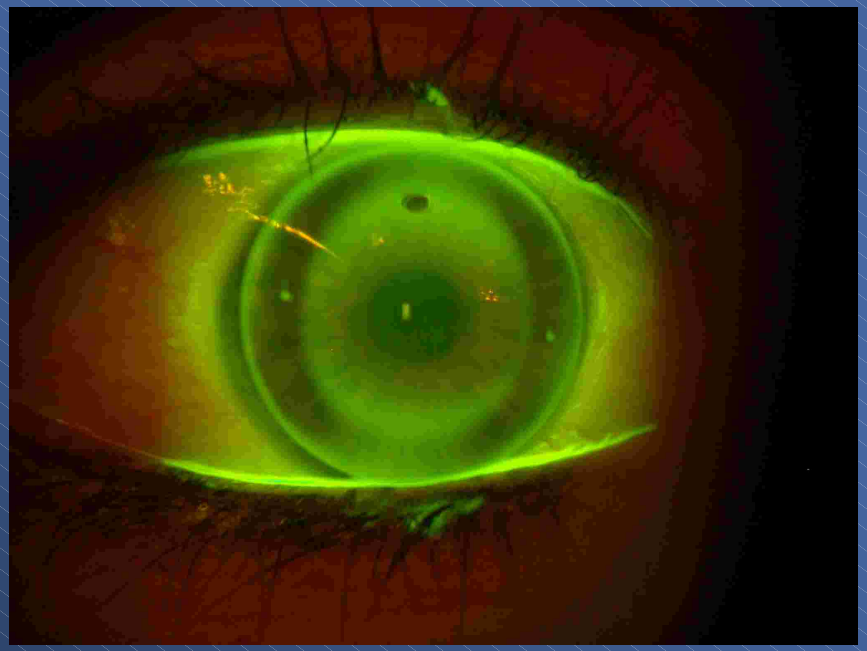
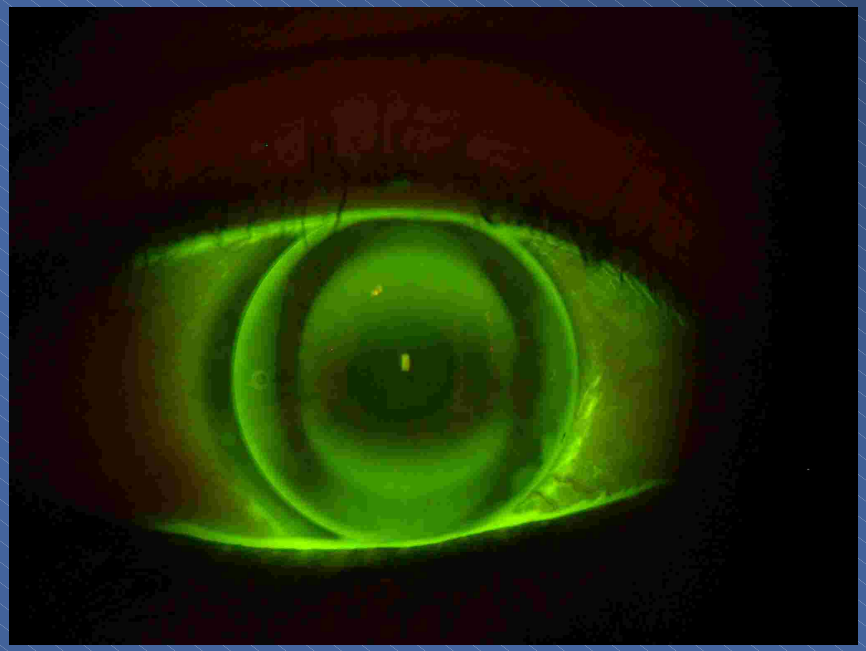
Torische FOKX
aktuelle Geometrie





1. Tag –0,25 –2,50 180°

6 Wochen + 0,25 –0,75 180°

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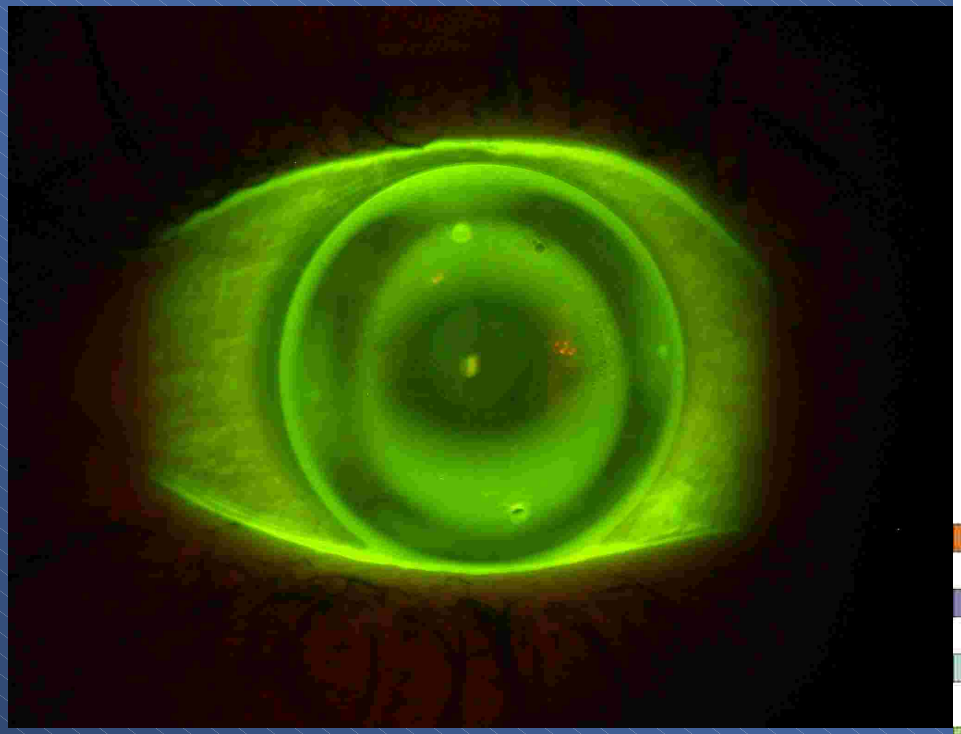
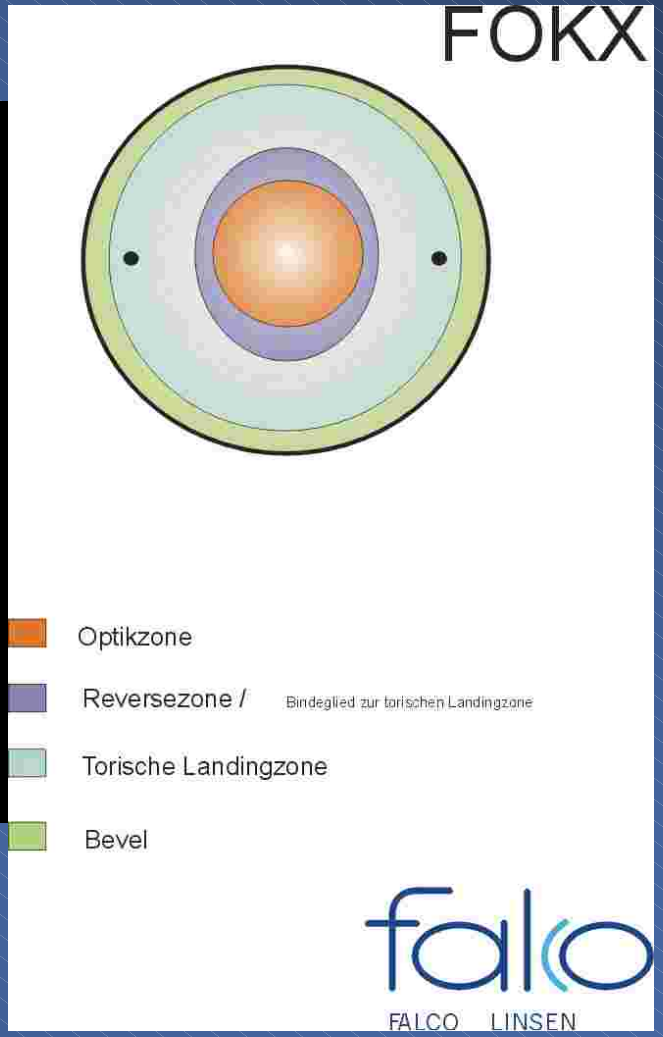
Torische FOKX





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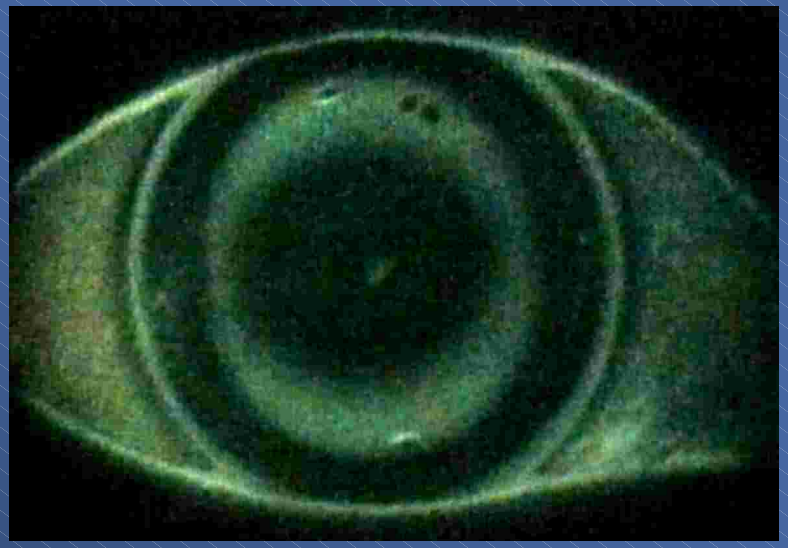
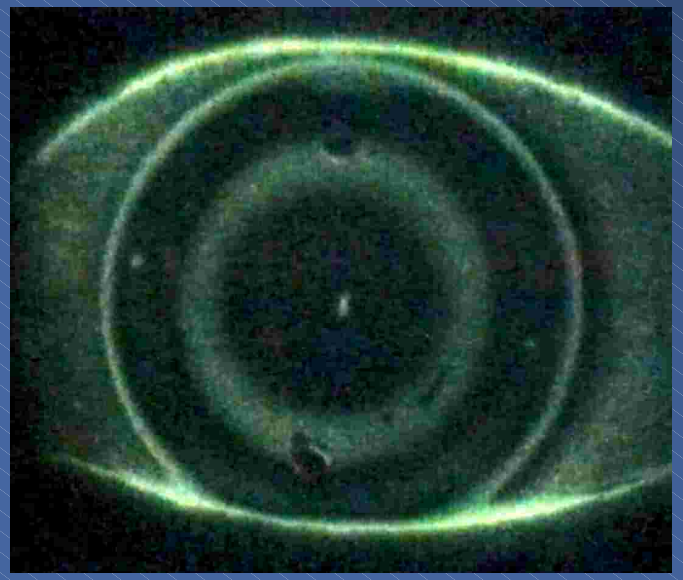
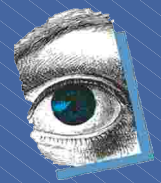
Torische FOKX





Anpassseminar demnächst bei FALCO



UNIVERSITÄTS-AUGENKLINIK BASEL

Ortho-K

Physiologie Up-Date

Stand 01-2004

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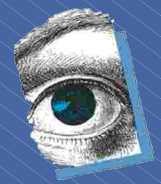
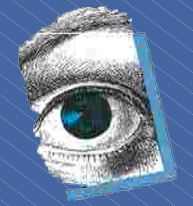


UNIVERSITÄTS-AUGENKLINIK BASEL

Lernziele

Jeder Teilnehmer :

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



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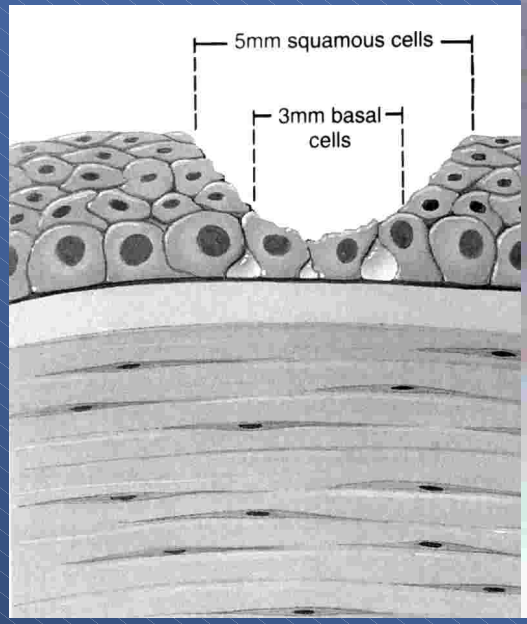
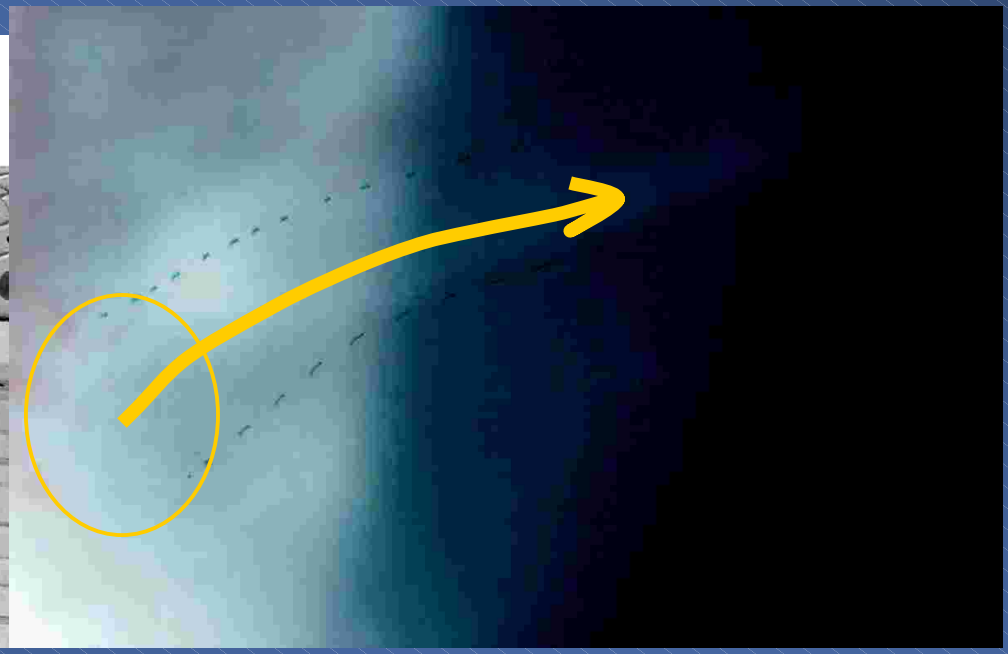
Anatomie

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

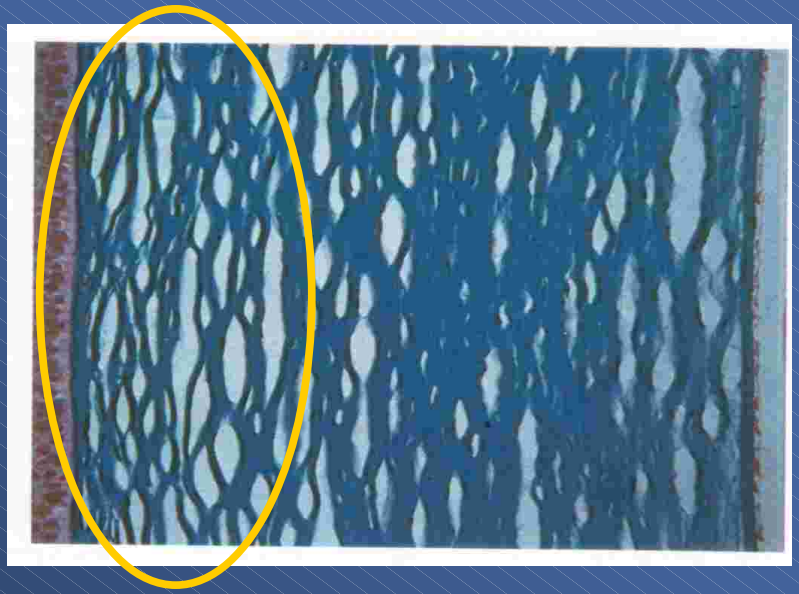
Bowman Membran : Dicke 7-14 micron, mechanisch widerstandsfähig

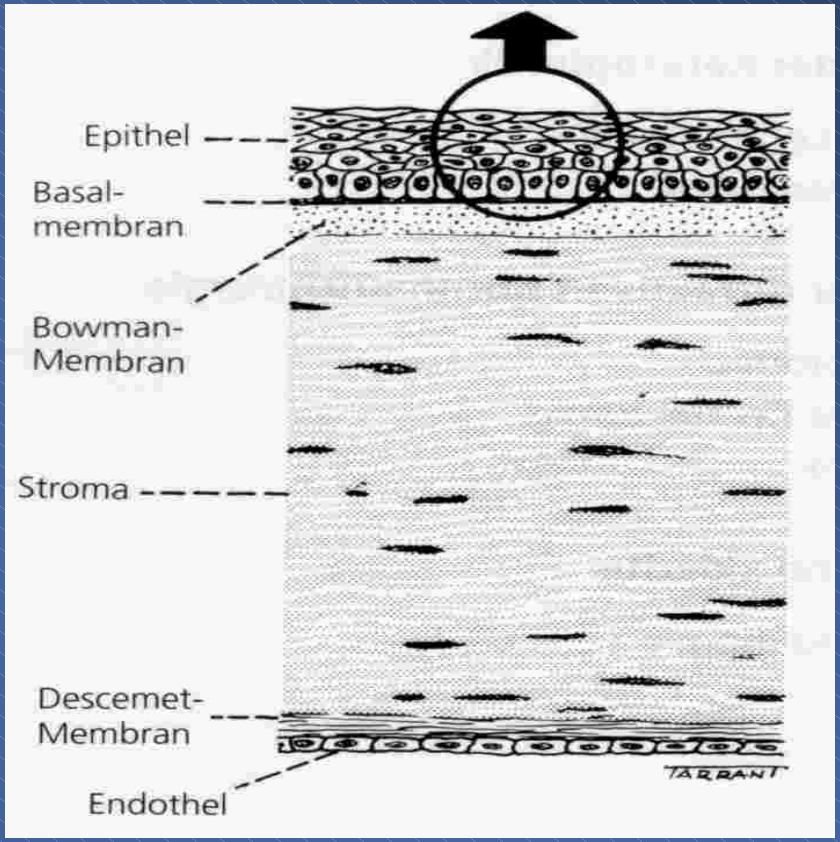
UNIVERSITÄTS-AUGENKLINIK BASEL

Anatomie

Die Hornhautschichten :

aus Werner Maidowski „Anatomie des Auges“ 1980

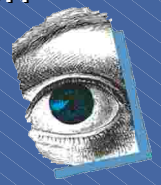




Das Stroma

Dicke : 450-500 microns,Nerven, Swann Zellen, lockere Kollagenfibrillen

v.a. im vorderen Drittel, regelmässiger und dichter posterior



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Anatomie

Die Hornhautschichten :

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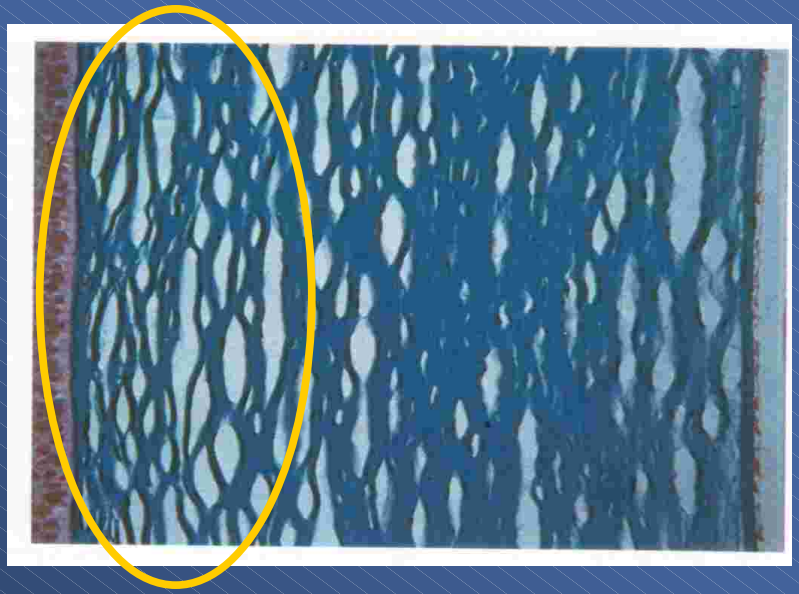
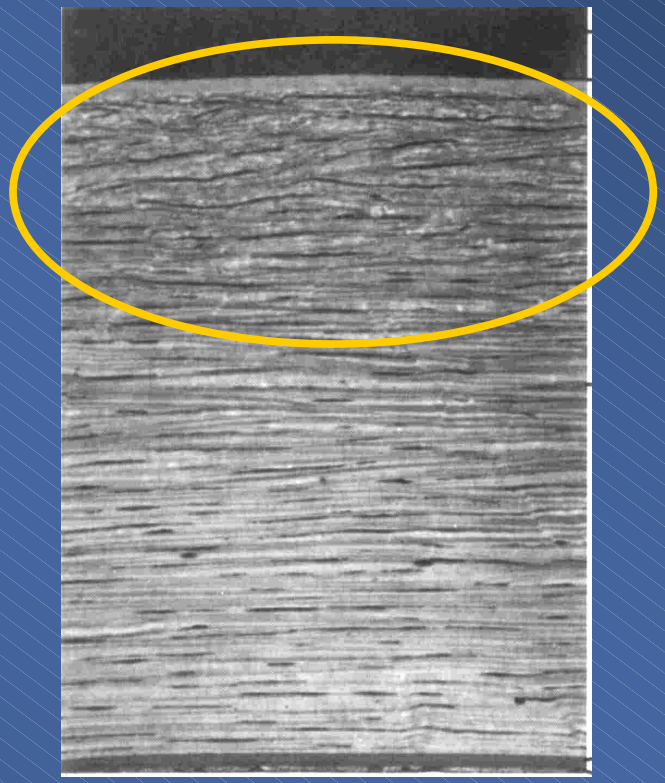


aus Herbert Kaufman „The Cornea“ 2000



Das Stroma

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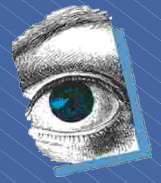


UNIVERSITÄTS-AUGENKLINIK BASEL

Physiologie

Das stimmt auch weiterhin im Grundsatz,

aber es gibt auch neue Erkenntnisse für Ortho-K !

- Epithelkompression
- Epitheldicke
- Hornhautschwellung
- Endotheldurchbiegung
- Aberrationszunahme

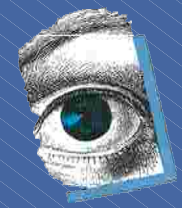
UNIVERSITÄTS-AUGENKLINIK BASEL

Epithelkompression

Theoretisch, mathematische Untersuchungen zur Munnerlyn-Formel durch Herr Dr. Andreas Berke, Köln in „die Kontaktlinse“ 12/2003

„Zusammenfassung : Die Änderung des Hornhautbrechwertes ist nicht auf die Abnahme der Hornhautdicke, sondern auf Abflachung der Hornhaut zurückzuführen. Die Abflachung beruht auf einem mechanischen Flachdrücken der zentralen Hornhaut, das auch zu einer verminderten zentralen Hornhautdicke führt. .....“

Dieses Vorgehen von Dr. Berke ist rein mathematisch und enthält noch keine Beweise zum histologischen Kern der Sache.



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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, 1week, 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).

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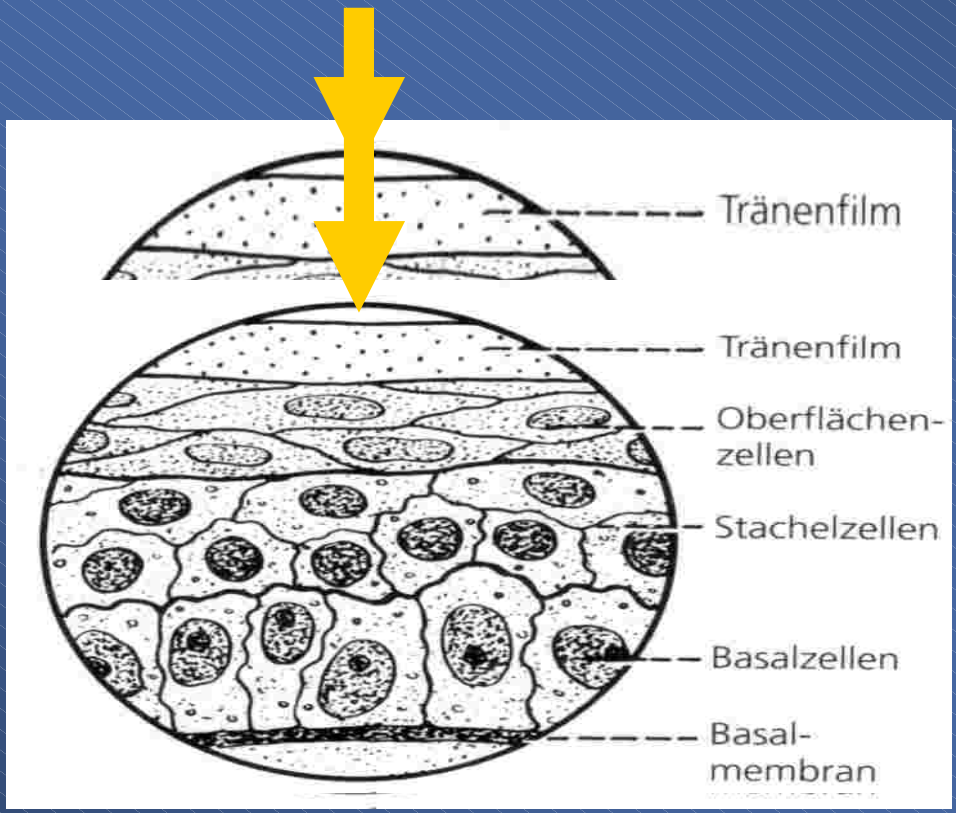
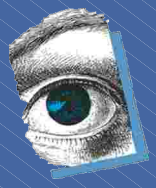
Epithelkompression

Konfokale Mikroskopieuntersuchungen durch Frau Dr. med. Gudrun Bischoff, Hamburg 2003

(pers. Korrespondenz, noch unveröffentlicht)





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Epithelkompression

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

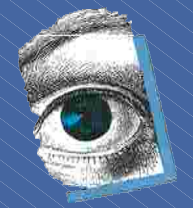
Piggyback Orthokeratology

Suzanne Effron et al.

„ ..... The effect of reverse geometry lenses on the cornea is multifactorial and probabely 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 ?



UNIVERSITÄTS-AUGENKLINIK BASEL

Epitheldicke

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

Epitheldickenveränderungen erkennbar, doch bisher noch nicht einwandfrei auswertbar.

UNIVERSITÄTS-AUGENKLINIK BASEL

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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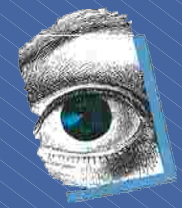


Stromaschwellung

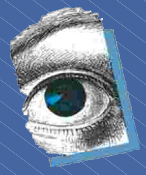
Invest Ophthalmol Vis Sci. 2003 Jun;44(6):2518-23.

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 (<or=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 +/- 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 +/- 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.



UNIVERSITÄTS-AUGENKLINIK BASEL

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)

Alan Kwok, OD und Marjorie Rah, OD, PhD, New England College of Optometry, Wissenschaftliches Papier, AAO Dallas 2003 S.243

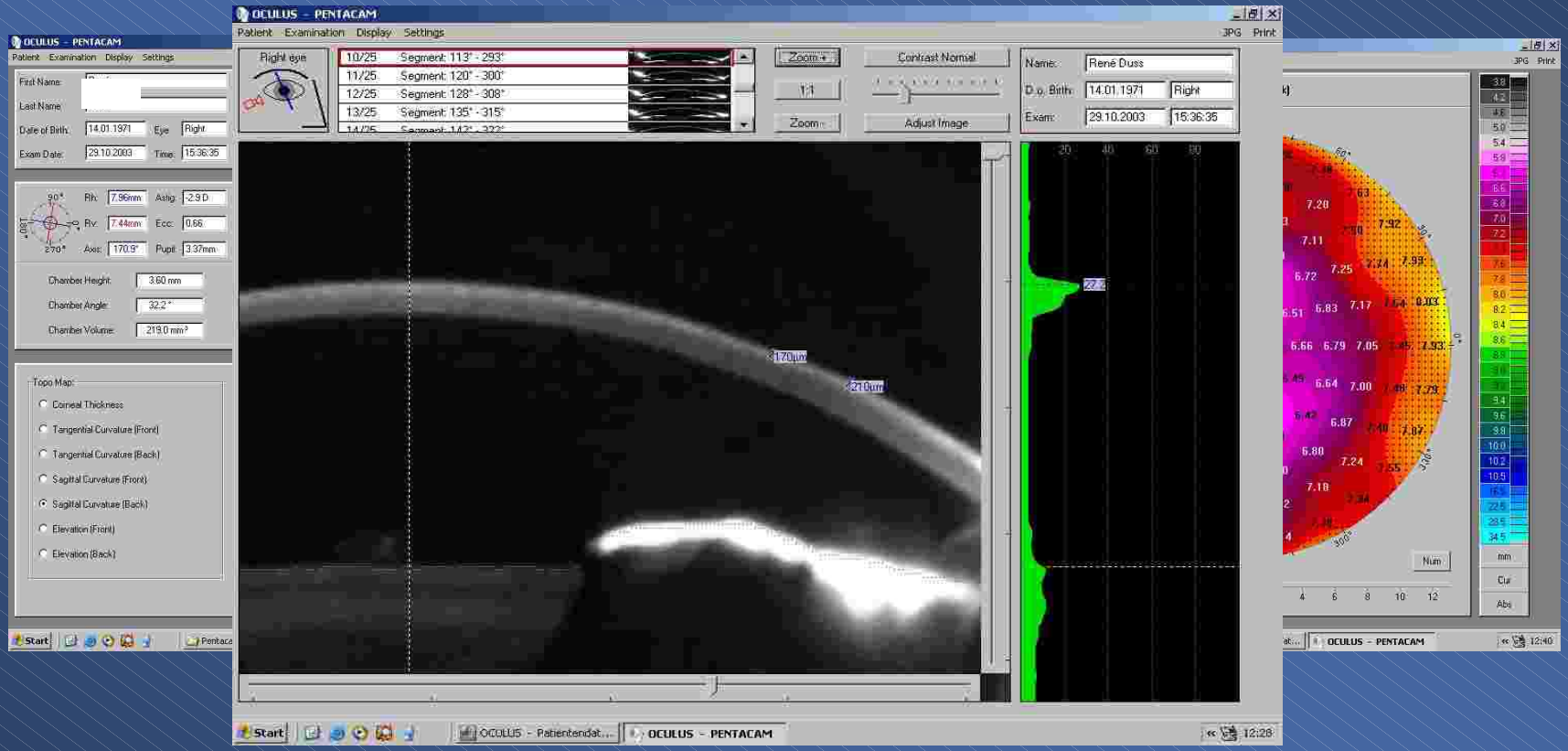
„The epithelial thickness measurements however did not show any consistent trend in the central or peripheral cornea. This indicates that either no significant change occurin the epithelium during overnight lens wear or that the instrument is not able to detect the changes.“

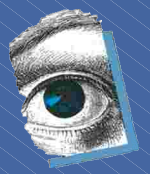
(Messung mit Ultrasound Pachymetry und nicht kohärent morgens nach der Erwachen)

UNIVERSITÄTS-AUGENKLINIK BASEL

Endotheldurchbiegung

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





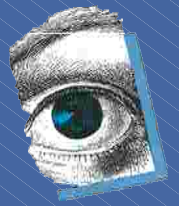
UNIVERSITÄTS-AUGENKLINIK BASEL

Aberrationszunahme

Pete Kollbaum, OD und Arthur Bradley, PhD Indiana University

Wissenschaftliches Papier, AAO Dallas 2003 S. 244

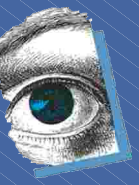
„ As expected, after wearing the lenses, average daily myopia was decreased from –3.49 +/- 0.80 D at baseline to –0.52 +/- 0.24 D at 1 month. However, with this decrease in myopia, average daily spherical aberration increased from +0.07 +/- 0.05 D at baseline to +0.18 +/-0.06 D at 1 month. This amounts 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 refractiv errror.“



UNIVERSITÄTS-AUGENKLINIK BASEL

That‘s all folks !

American Academy of Optometry Dallas 2003



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