

Tooriset tekomykiöt

kokemuksia, tuloksia, vinkkejä

Henrik Rintala, 7. 10. 2013
TAYS

Mistä hajataitto tulee?

- ▶ Sarveiskalvo ei aina täysin symmetrinen (taittovoima voi vaihdella eri suunnissa)
- ▶ Mykiö tai tekomykiö:
 - ▶ Mykiö ei täysin symmetrinen (usein kompensoi osittain sarveiskalvon hajataitteisuutta)
 - ▶ Trauma, löysät zonulat, Marfan: subluksoitunut mykiö
 - ▶ Desentroitunut tai tilttaava IOL (esim. kapselipussi löysä, toinen haptiikka sulkuksessa & toinen pussissa)
- ▶ Silmänpohja voi olla vino (myooppinen konus)

Toorinen? Sfäärinen?

- ▶ “Tavallinen” (esim. AMO Tecnis ZA9003) tekomykiö taittaa valoa samalla tavoin kaikissa suunnissa (vrt. sfäärinen silmälasilinssi)
- ▶ Toorinen tekomykiö korjaa hajataitteisuutta (vrt. silmälasilinssi, jossa sylinterikorjaus), esim. yksi akseli 22 D, toinen akseli 26 D eli sylinteri 4 D (sfäärinen ekvivalentti 24 D)

Miksi toorinen?

- ▶ Tavalliset tekomykiövahvuudet 0,5 D - 1,0 D välein
- ▶ 1 D korjaamatonta astigmatiaa vastaa 0,5 D sfääristä virhettä
- ▶ Esim. 6 D hajataitteisuus: kuvanlaatu yhtä huono kuin 3 D pielessä oleva tekomykiön vahvuus ilman laseja katsoen
- ▶ *Jos valitsemme tekomykiöitä 0,5 D välein, miksi jätämme yli 1 D hajataiton korjaamatta?*
 - IOL hinta n. +200 €, linssi tilattava, lisätutkimusten tarve, jos esitutkimus leikkauspäivänä toimenpiteen peruminen, uusi leikkausaika, toimitusaika 1 vko - 2 kk...

Potilasvalinta, toorinen IOL

- ▶ Hyötyykö potilas toorisesta linssistä?
 - ▶ Makuladegeneraatio?
 - ▶ Amblyopia?
 - ▶ Toinen silmä (onko leikattu, hajataitteisuus?)
 - ▶ Joudutaanko perumaan leikkaus ja antamaan uusi aika?
 - ▶ Väheneekö lasien tarve, paraneeko elämänlaatu?

Kontraindikatioita (mykiö)

- ▶ Phakodoneesi
- ▶ Exfoliaatio, löysä zonula
- ▶ Kapselipussin repeämä leikkauksessa
- ▶ Sulkusfiksaatio (paitsi sulkukseen tarkoitettut tooriset, esim. Rayner Sulcoflex, Humanoptics Torica sS, sPB)
- ▶ Potilaalla riski joutua sarveiskalvonsiirtoon
--> harkitse sulkusfiksaatiota

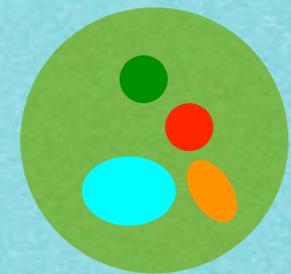
Sarveiskalvon edellytykset

- ▶ Pääosin säännöllinen hajataiteisuus
- ▶ Ei etenevää sarveiskalvosairautta (sulkusfiksaatiolinssi helpompi poistaa)
- ▶ Sarveiskalvon siirto - siirrännäisen ennuste (sak-siirto muuttaa astigmatiaa, taittovoimaa), re-transplantaatio muuttaa tilanteen täysin erilaiseksi, IOL vaihto...???

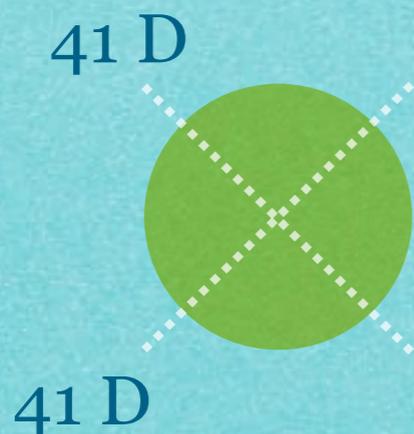
Sarveiskalvo

- ▶ Sarveiskalvo voi olla muodoltaan säännöllinen tai epäsäännöllinen (asymmetrinen):

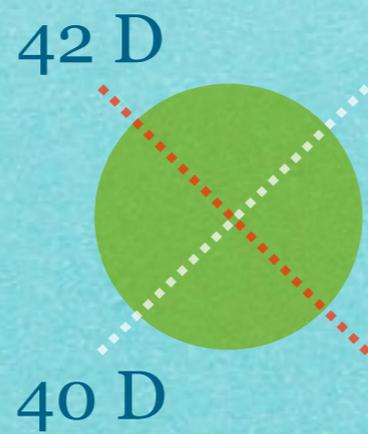
Arvet



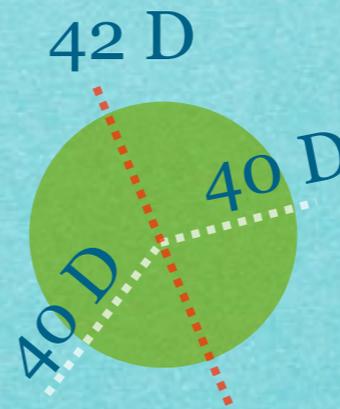
Ei hajataittoa
Cyl 0 D



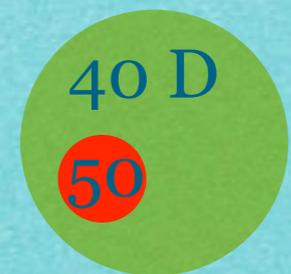
Säännöllinen
Cyl 2 D



Epäsäännöllinen
Cyl 2 D



Keratokonus
Cyl ???



Tarvittavat mittaukset

- ▶ Aksiaalimitta (AL): *IOL-Master* tai *ultraääni*
- ▶ Sarveiskalvon mitat: *IOL-Master*, *autorefrakto-keratometri*, *käsikeratometri*
 - todetaan sarveiskalvon hajataitteisuus, toorinen IOL...?
- ▶ Etukammion syvyys: *IOL-Master*, *Galilei*, *ultraääni*
- ▶ Sarveiskalvon tarkempi mittaus: *Galilei*
- ▶ Tekomykiön laskenta ja tilaus

Kuinka paljon sylinteriä?

- ▶ 1,0 D corneal plane \approx 1,5 D IOL plane (kapselipussi)

▶ Alcon

| ALCON® LENS MODEL | | SN6AT3 | SN6AT4 | SN6AT5 | SN6AT6 | SN6AT7 | SN6AT8 | SN6AT9 |
|--|----------------|-----------------|------------------|------------------|------------------|------------------|------------------|---------------|
| Cylinder Power | IOL Plane | 1.50 D | 2.25 D | 3.00 D | 3.75 D | 4.50 D | 5.25 D | 6.00 D |
| | Corneal Plane* | 1.03 D | 1.55 D | 2.06 D | 2.57 D | 3.08 D | 3.60 D | 4.11 D |
| Recommended Corneal Astigmatism Correction Range | | 0.75D to 1.54 D | 1.55 D to 2.05 D | 2.06 D to 2.56 D | 2.57 D to 3.07 D | 3.08 D to 3.59 D | 3.60 D to 4.10 D | 4.11 D and up |

*Based on average pseudophakic human eye.

▶ AMO

Cylinder Power Options

| Lens Model | ZCT100 | ZCT150 | ZCT225 | ZCT300 | ZCT400 |
|--------------------------------------|-------------|-------------|-------------|-------------|---------|
| Cylinder Power IOL Plane | 1.00 D | 1.50 D | 2.25 D | 3.00 D | 4.00 D |
| Corneal Plane* | 0.69 D | 1.03 D | 1.54 D | 2.06 D | 2.74 D |
| Corneal Astigmatism Correction Range | 0.50–0.75 D | 0.75–1.50 D | 1.50–2.00 D | 2.00–2.75 D | >2.75 D |

*Based on average pseudophakic human eye.

- ▶ Sulkuksessa hieman vähemmän sylinteriä tarpeen

Keratometri: D vai mm? K vai R?

- ▶ Keratometri mittaa sarveiskalvon etupinnan kaarevuuden
- ▶ Takapinta kaartuu hieman eri tavalla
- ▶ Sarveiskalvon taittovoima lasketaan “väärällä” taitekertoimella, jolloin taittovoima dioptereissa on “oikea” - heittoa tulee esim. jos on etupintaa hoidettu, mutta ei takapintaa (LASIK, PRK)
- ▶ **Radius** eli säde ilmoitetaan millimetreinä
K-arvo eli taittovoima dioptereina

Sarveiskalvon taitekerroin

- ▶ Useimmat keratometrit käyttävät taitekertoimenä **$n = 1,3375$**
- ▶ Oikea, “todellinen” taitekerroin $n = 1,332$ normaalisilmässä (ilma-sarveiskalvo-kammioneste)
- ▶ Tämä “virhe” on otettu laskentakaavoissa huomioon
- ▶ Mittalaitteet yleensä tulostavat käytetyn taitekertoimen
- ▶ Esim. Pentacam tai Galilei mittaavat etu- ja takapinnan ($n_{\text{cornea}} = 1,376$, $n_{\text{aqueous}} = 1,336$) ja laskevat todellisen taittovoiman (*total corneal power*)
- ▶ Total corneal power:in käyttö laskentakaavoissa aiheuttaa virheen koska kaavat kompensoivat “väärän taitekertoimen” käytön - **käytä SimK-lukemia** (Galilei), joka laskee taittovoiman takaisin “väärin”...
- ▶ Taitekerrointa ei tarvitse miettiä jos syöttää kaavoihin säteen (R/mm)
- ▶ Jos ilmoittaa sarveiskalvon taittovoiman, ei välttämättä tiedä mikä on mitattu säde, ellei käytetty taitekerroin ole tiedossa (meillä yleensä 1,3375, mutta senkin voi “räplätä” laitteessa pieleen...)

Sarveiskalvon merkintä

- ▶ Mikroskoopin ääressä istuen (koska mittauksetkin tehdään istuen, makuulla saattaa tulla syklorotaatiota)
- ▶ Silmän pinnan puudutus
- ▶ Kapea rakovalo, käännetään haluttulle implantaatioakselille
- ▶ Pienet naarmut epiteeliin neulalla ja sitten tussilla värjäys, pelkkä tussimerkintä saattaa hävitä näkyvistä pesun/leikkauksen aikana



1

@ 60°



kapea rakovallo
@ 60°

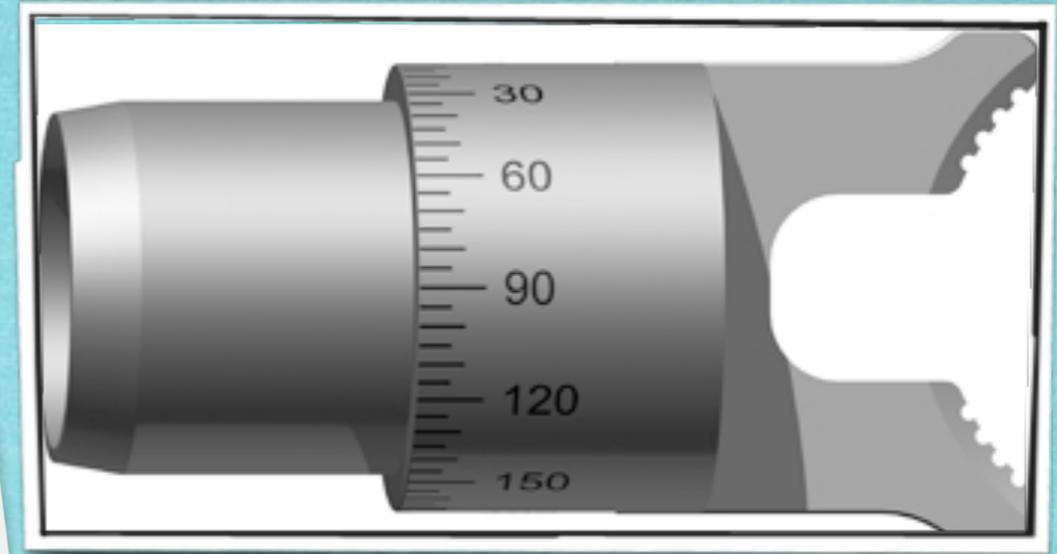
2



3

tussi + naarmu neulalla @ 60°

Tonometrin merkkauskärki



Mikroskooppiin projisoitu
implantaatioakseli, eyetracker



Markkeri



Markkeri, jossa punnus

Toorisia linssejä
(esimerkkejä, muitakin löytyy)

Alcon Acrysof (IQ)Toric

*SE +6...+30 D
cyl (IOL-taso)*

SN60(A)T3 - 1,50 D

SN60(A)T4 - 2,25 D

SN60(A)T5 - 3,00 D

SN60(A)T6 - 3,75 D

SN60(A)T7 - 4,50 D

SN60(A)T8 - 5,25 D

SN60(A)T9 - 6,00 D

A-vakio 119,0

Takakammiolinssi (kapselipussiin)



<http://www.acrysoftoriccalculator.com>

AMO

Tecnis Toric

SE +5 ... +30 D (step 0,5 D)

ZCT100 1,00 D

ZCT150 1,50 D

ZCT225 2,25 D

ZCT300 3,00 D

ZCT400 4,00 D

A-vakio 118,8

Takakammiolinssi (kapselipussiin)

<https://www.amoeasy.com/calc>



Zeiss AT Torbi 709M/MP

Helppo asentaa, voi pyörittää myötä-
ja vastapäivään

709MP: esiladattu

- Sphere +6,0 ... +24,0 D, step 0,5 D
Cylinder +1,0 ... +4,0 D, step 0,5 D

709M: itse ladattava

- Sphere -10,0 ... +32,0, step 0,5 D
Cylinder +1,0 ... +12,0, step 0,5 D

A-vakio 117,9 (SRK/T)

Laskuri vaatii etukammion syvyyden!

Takakammiolinssi (kapselipussiin)

<https://zcalc.meditec.zeiss.com> (vaatii rekisteröitymisen)



Bausch & Lomb enVista MX60T

Ladattava

Sphere

- +6,0 ... +30,0, step 0,5 D

Cylinder

- 1,25 D, 2,00 D, 2,75 D

A-vakio 119,1, optical (SRK/T)

Takakammiolinssi (kapselipussiin)



<https://envista.toriccalculator.com>

Rayner T- Flex Toric

T-flex623T

- optiikan \varnothing 6,25 mm, \varnothing 12,5 mm

T-flex 573T

- optiikan \varnothing 5,75 mm, \varnothing 12,0 mm

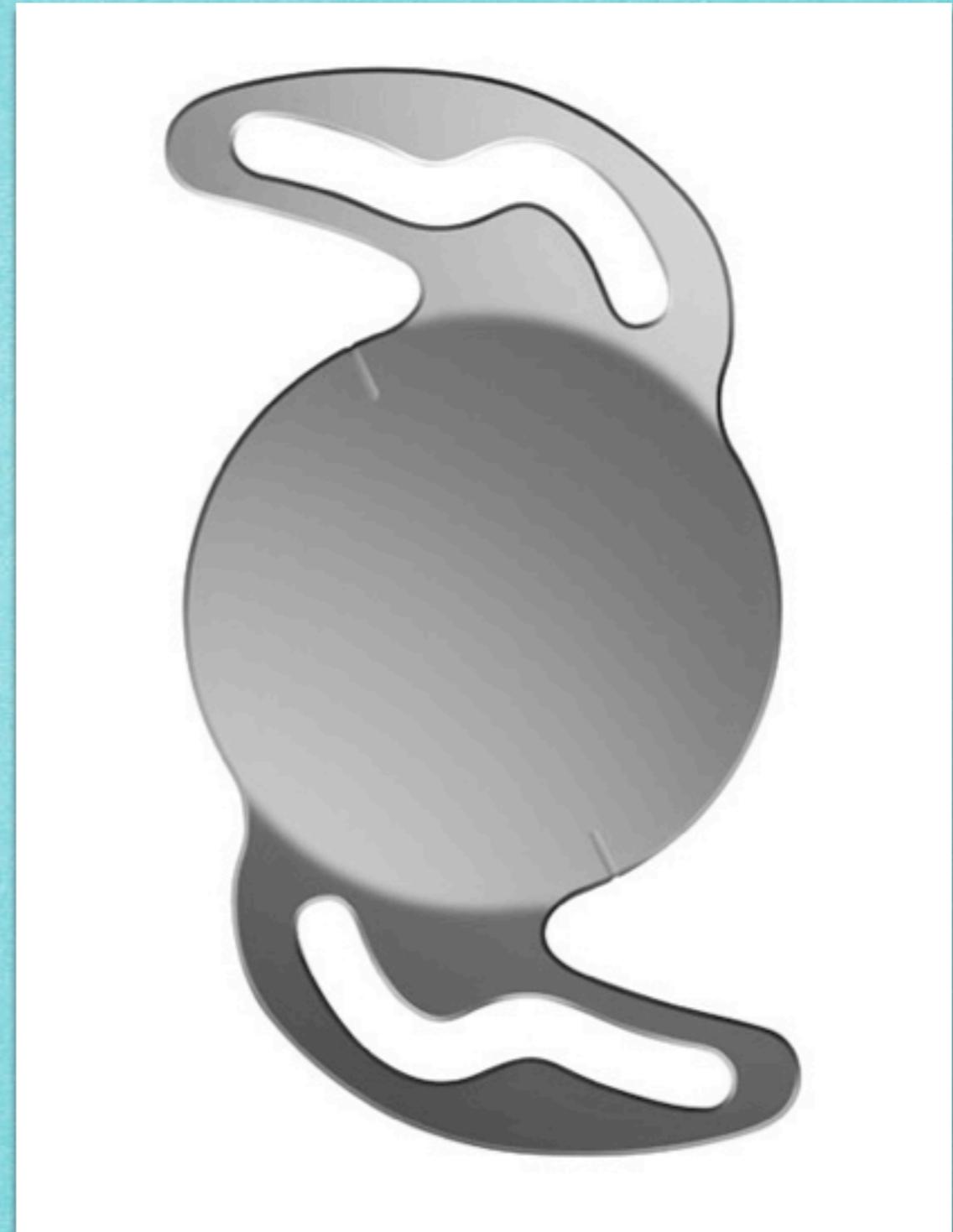
Standard Power Range

- Spheres: +6.0D to +30.0D in 0.5D increments
- Cylinders: +1.0D to +6.0D in 0.5D increments

Premium Power Range:

- Spheres: -10.0D to +35.0D maximum (SE) in 0.5D increments
- Cylinders: +1.0D to +11.0D in 0.25D increments.
- A-vakio 118,9

Takakammiolinssi (kapselipussiin)



Rayner Sulcoflex Toric

*Asennetaan sulkukseen kapseli-
pussissa olevan IOL:n päälle
(esim. sak-siirtopotilas)*

Standard range

- SE -3,0 ... +3,0, step 0,5 D
Cylinder: 1,0, 2,0, 3,0

Premium range*

- SE -6,0D ... +6,0, step 0,5
cylinder +1.0 ... +6.0, step 0,5 D

Sulkuslinssi pseudofaakkiin silmään



<https://www.toriciol.rayner.com> (vaatii rekisteröitymisen)

Edustus Suomessa: <http://iogen.fi>

Humanoptics

Torica -aA

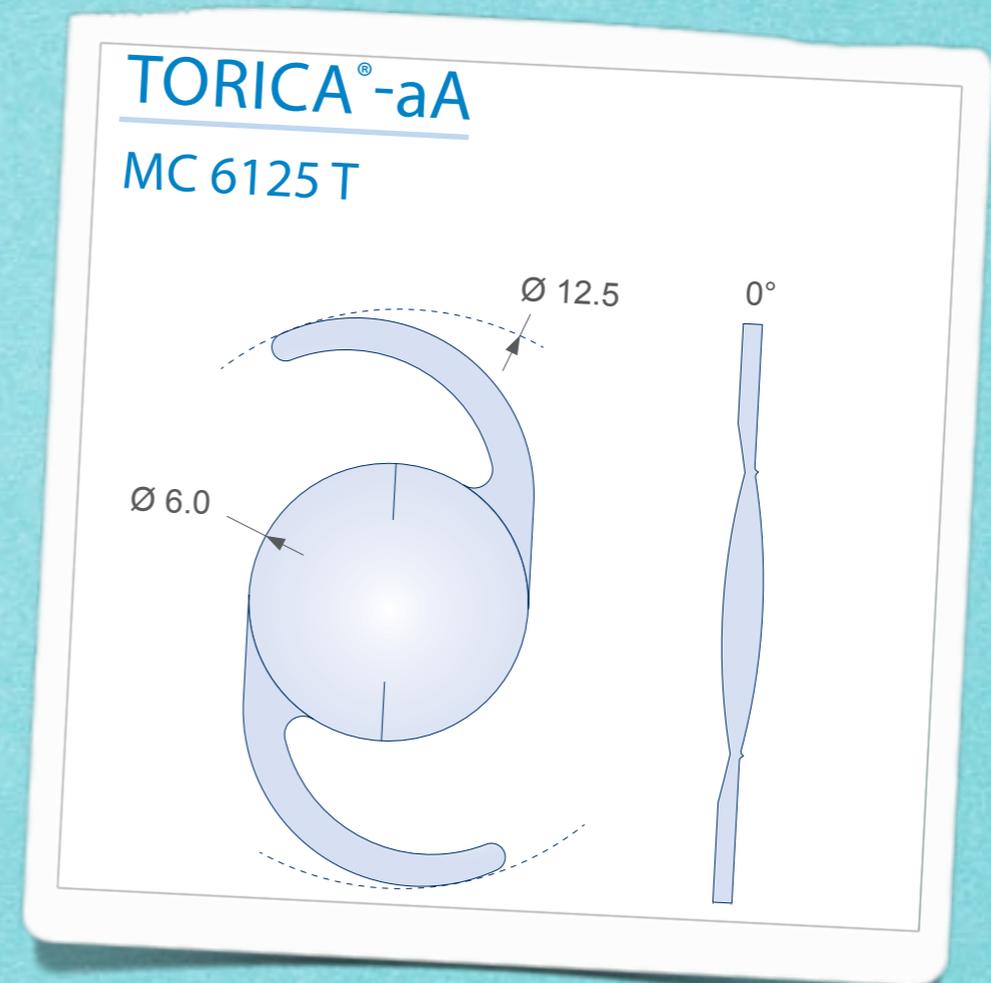
Sphere

- +15,0...+25,0 D (0,5 D steps)

Cylinder

- +1,0...+6,0 D (1,0 D steps)
- A-vakio 118,4 (optical biometry)
- **Takakammiolinssi (kapselipussi)**

<http://www.humanoptics.com>
mail@humanoptics.com



Humanoptics

Torica -s

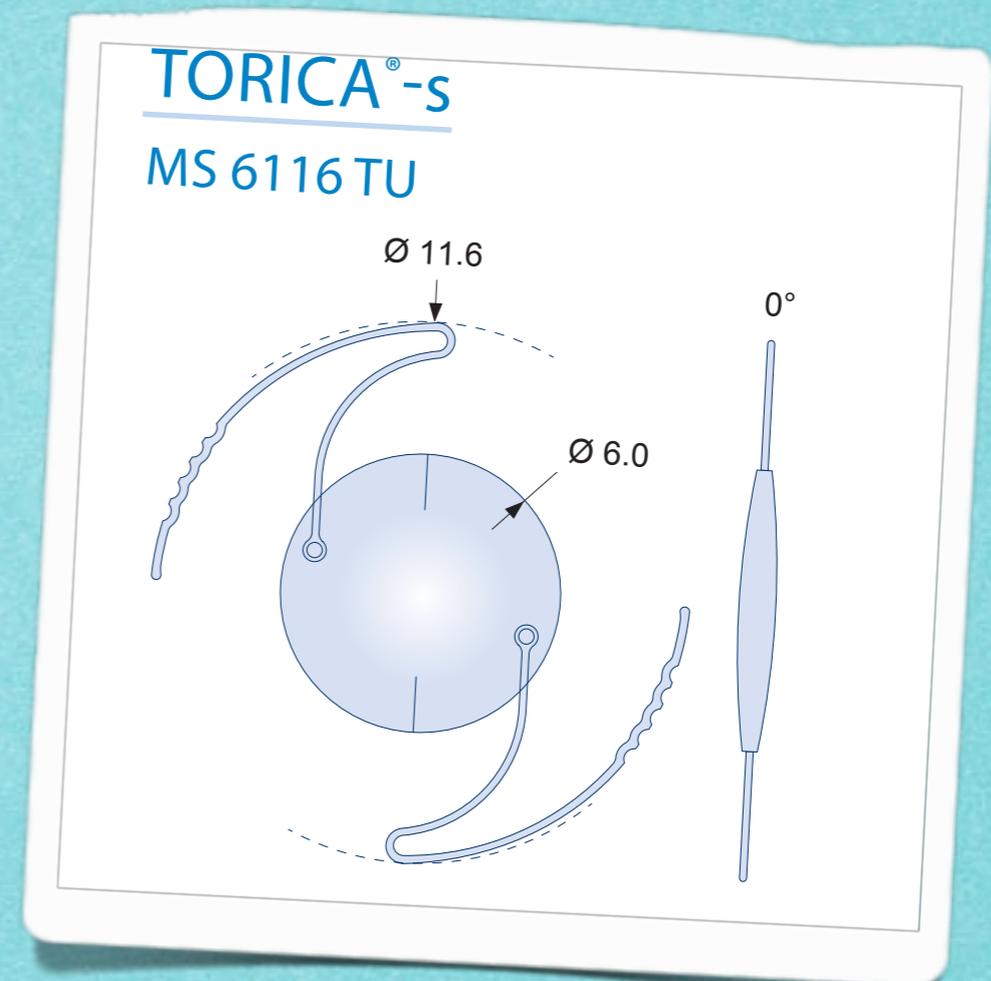
Sphere

- +15,0...+25,0 D (0,5 D steps)
- -30,0...+14,0 D (1,0 D steps)
- +26,0...+34,0 D (1,0 D steps)

Cylinder

- +1,0...+3,0 D (0,5 D steps)
- +4,0...+30,0 D (1,0 D steps)
- A-vakio 118,6 (optical biometry)
- **Takakammiolinssi (kapselipussi)**
- Myös keltaisena (Torica-sY)
- Merkit osoittavat plus-sylinterin akselin

<http://www.humanoptics.com>
mail@humanoptics.com



Humanoptics Torica -sS

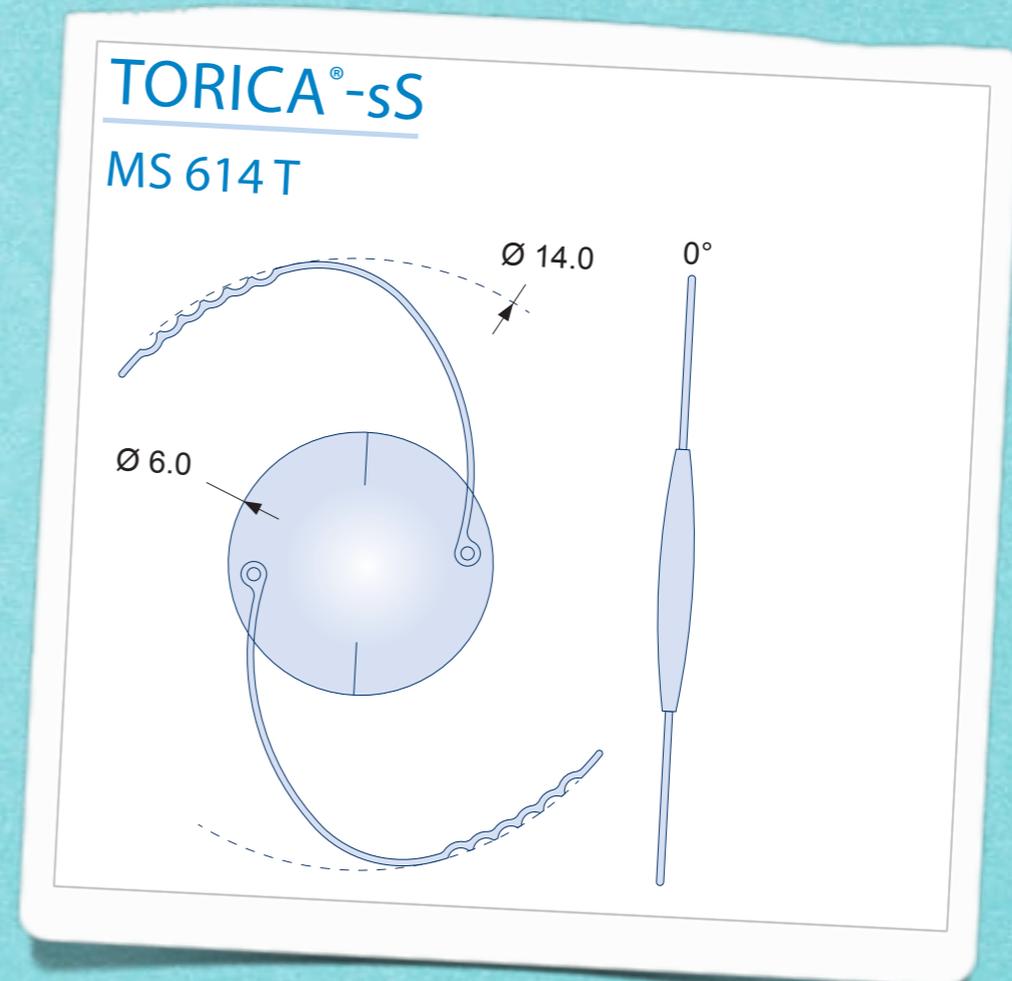
Sphere

- +15,0...+25,0 D (0,5 D steps)
- -30,0...+14,0 D (1,0 D steps)
- +26,0...+34,0 D (1,0 D steps)

Cylinder

- +1,0...+3,0 D (0,5 D steps)
- +4,0...+30,0 D (1,0 D steps)
- A-vakio 118,0 (optical biometry)
- **Sulkusfiksaatio afaaktiin silmään**
- Myös keltaisena (Torica-sSY)
- Merkit osoittavat plus-sylinterin akselin

<http://www.humanoptics.com>
mail@humanoptics.com



Humanoptics Torica -sPB

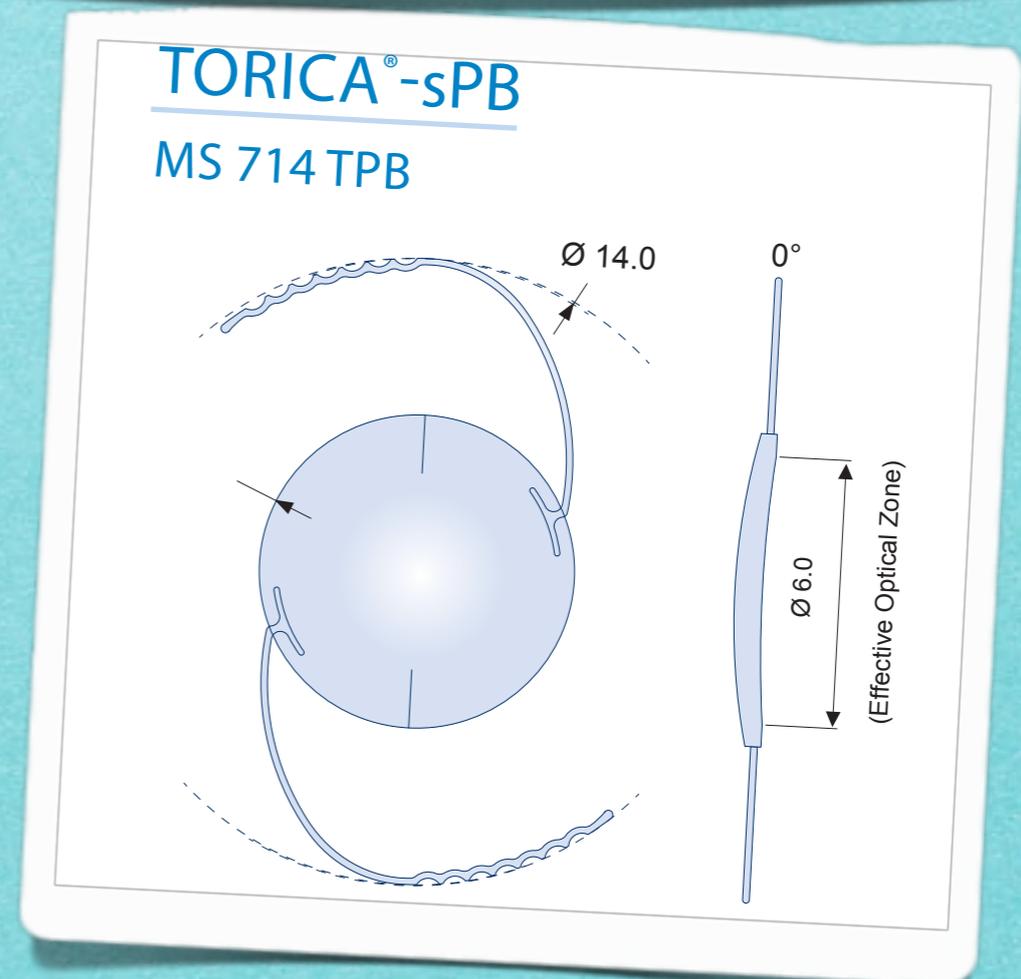
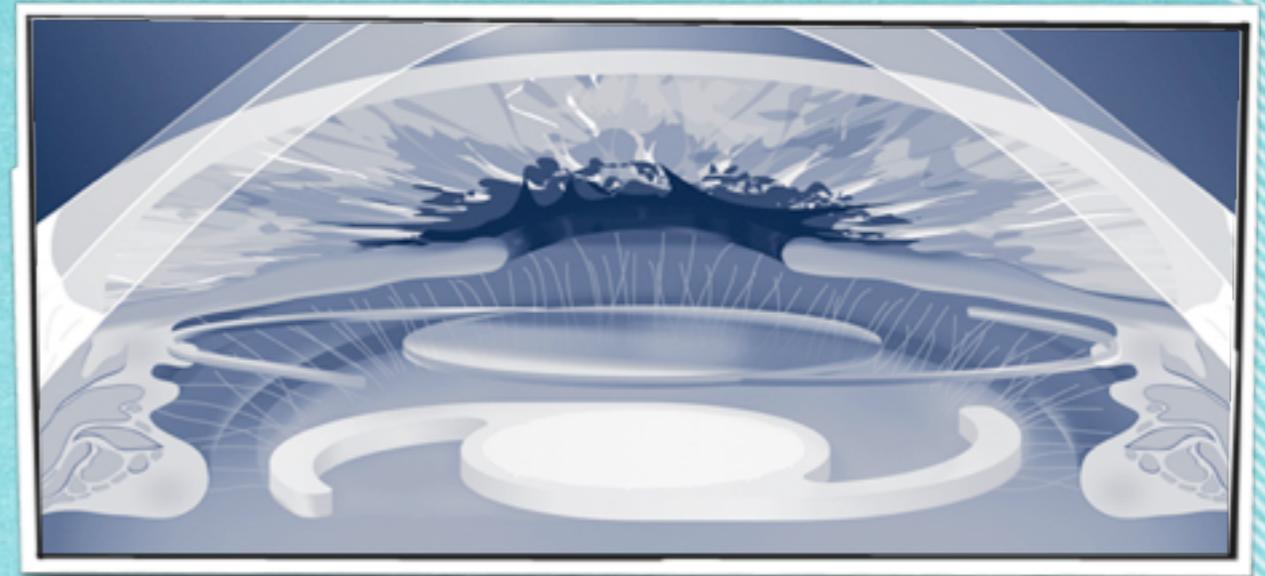
Sphere

- -6,0 ... +3,0 D (0,5 D steps)
- -30,0 ... -7,0 D (1,0 D steps)
- +4,0...+6,0 D (1,0 D steps)

Cylinder

- +1,0...+30,0 D (1,0 D steps)
- A-vakio (ei käytetä)
- **Sulkuslinssi pseudofaakkiin silmään**
- Myös keltaisena (Torica-sPBY)

<http://www.humanoptics.com>
mail@humanoptics.com



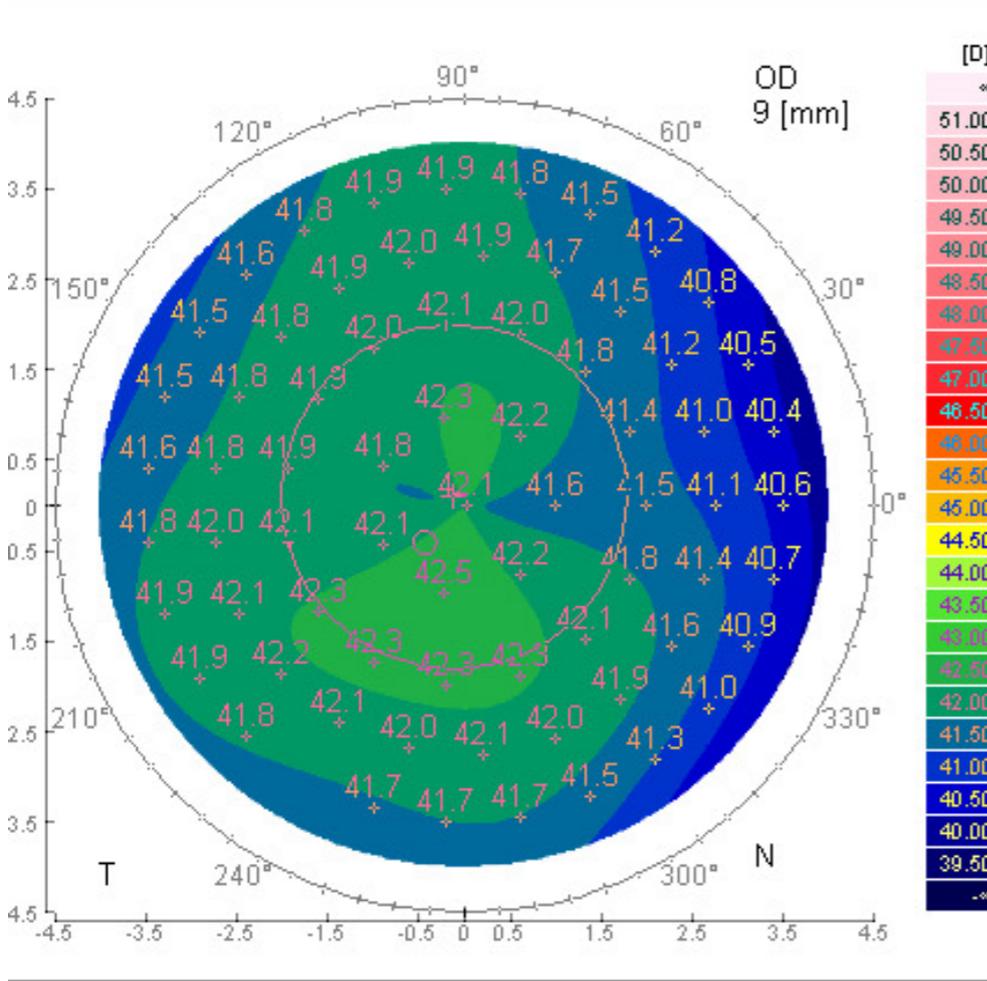


Esimerkkitapauksia

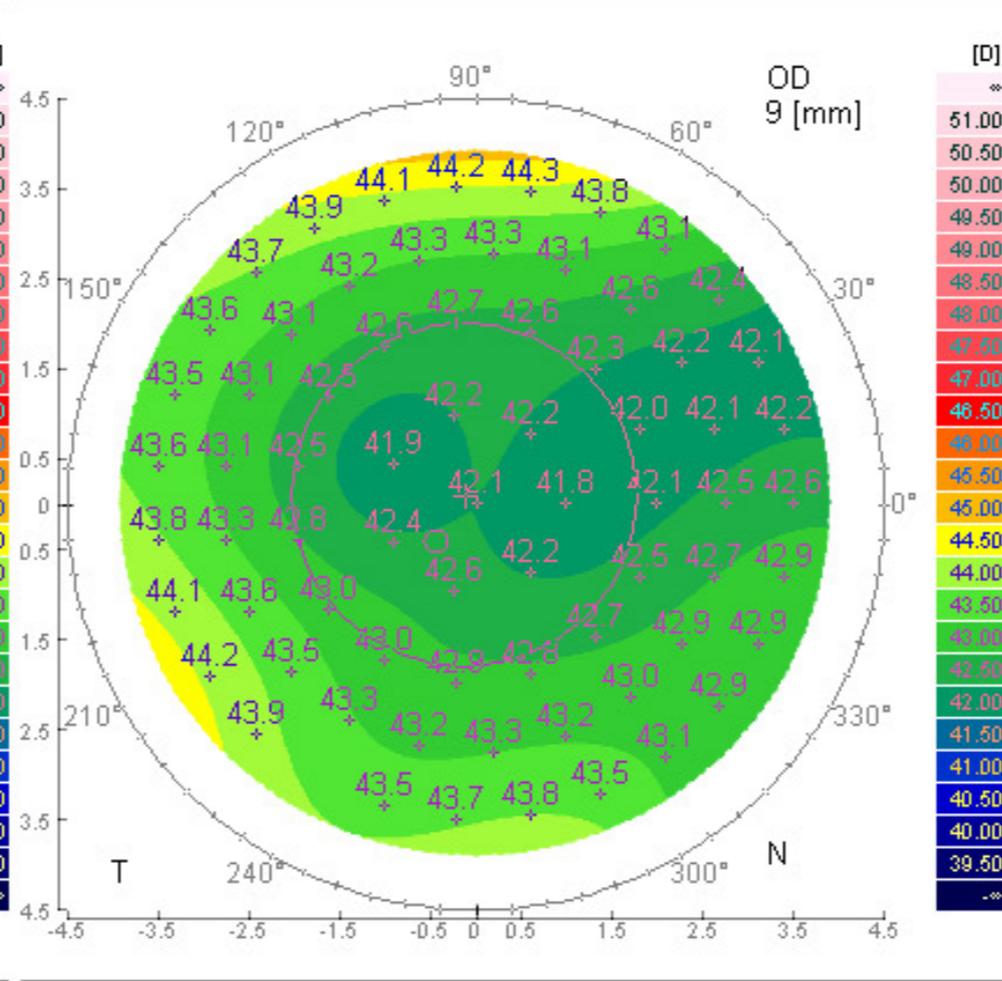
*Oma silmä, ei
indikaatiota tooriselle...*

Galilei IOL Power - Vähäinen hajataitteisuus

Axial Curvature
n=1.3375 ROIØ=8.0 [mm]



Total Corneal Power (Ray Traced)
ROIØ=7.8 [mm]



SimK Values
n=1.3375 ROIØ=1-4[mm]

SimKavg 42.05 [D] (8.03 [mm])
SimKf 41.72 [D] (8.09 [mm])
SimKs 42.38 [D] (7.96 [mm])
Astigmatism 0.66 [D] @85.0 [°]

Anterior Instantaneous Curvature

Kavg n/a
Kf n/a
Ks n/a
Astigmatism n/a
 ϵ^2 0.15

Total Corneal Power (Ray Traced)
ROIØ=1-4[mm]

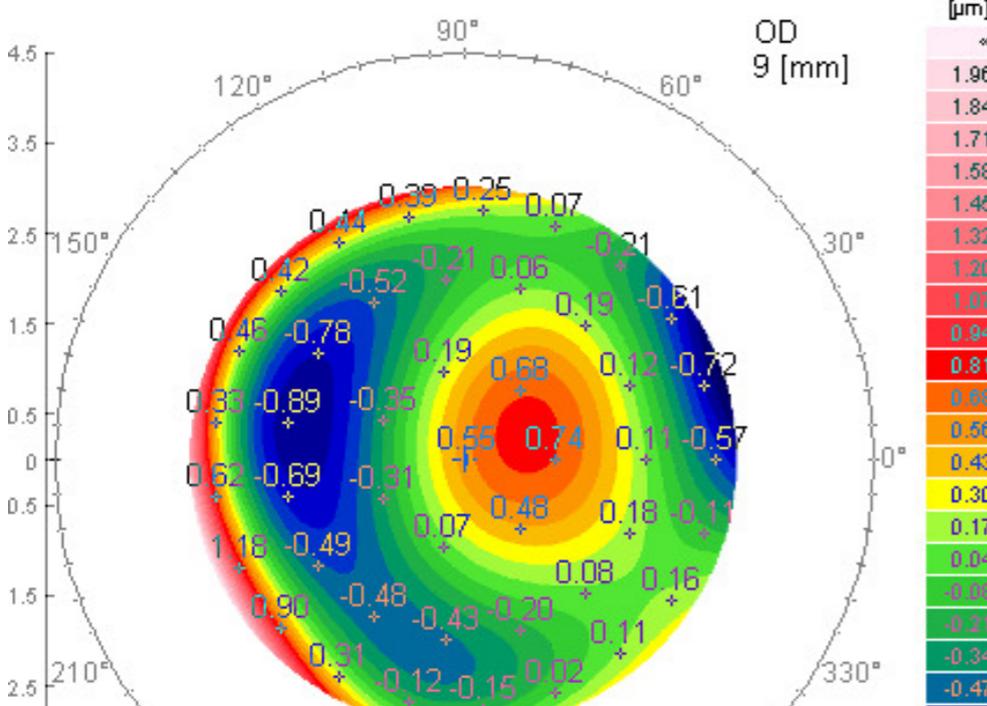
Mean 42.27 [D]
Flat 42.03 [D]
Steep 42.52 [D]
Astigmatism 0.49 [D] @80.0 [°]
Central Avg. 42.22 [D] ROIØ=0-4[mm]
Paracentral Avg. 42.97 [D] ROIØ=4-7[mm]
Peripheral Avg. 43.55 [D] ROIØ=7-10[mm]

Total Corneal Wavefront
n=1.376 ROIØ=6[mm]

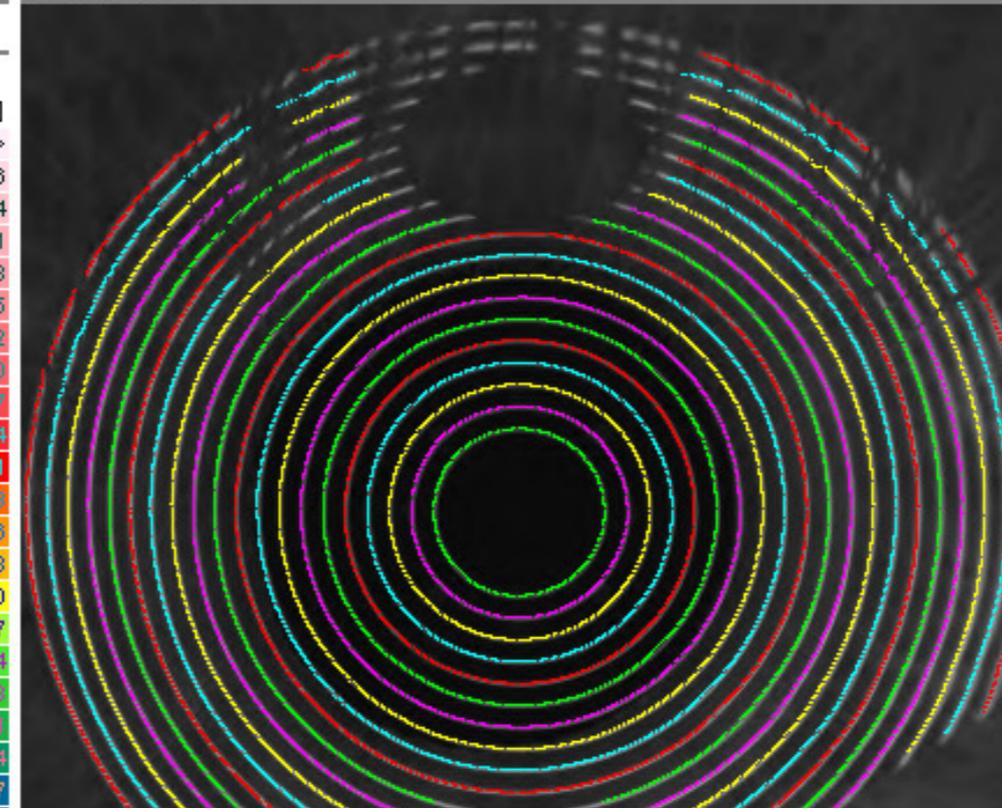
RMS HOA 0.48 [µm]
Spherical Aberration 0.24 [µm]

Total Corneal Wavefront HOA
ROIØ=6.0 [mm] RMS=0.48 [µm]

Aligned with pupil.



Placido Image



Chamber (Ray Traced)

Avg. Anterior Segment Length...
...from Endothelium n/a
Avg. Anterior Chamber Depth...
...from Endothelium 3.79 [mm]
Volume (Ø8mm) 168.5 [mm³]

Avg. An... 62.3 [°]
T 59.6 [°] 58.5 [°] N
60.2 [°]

Limbus

Nasal-Temporal 13.06 [mm]
Superior-Inferior 13.18 [mm]

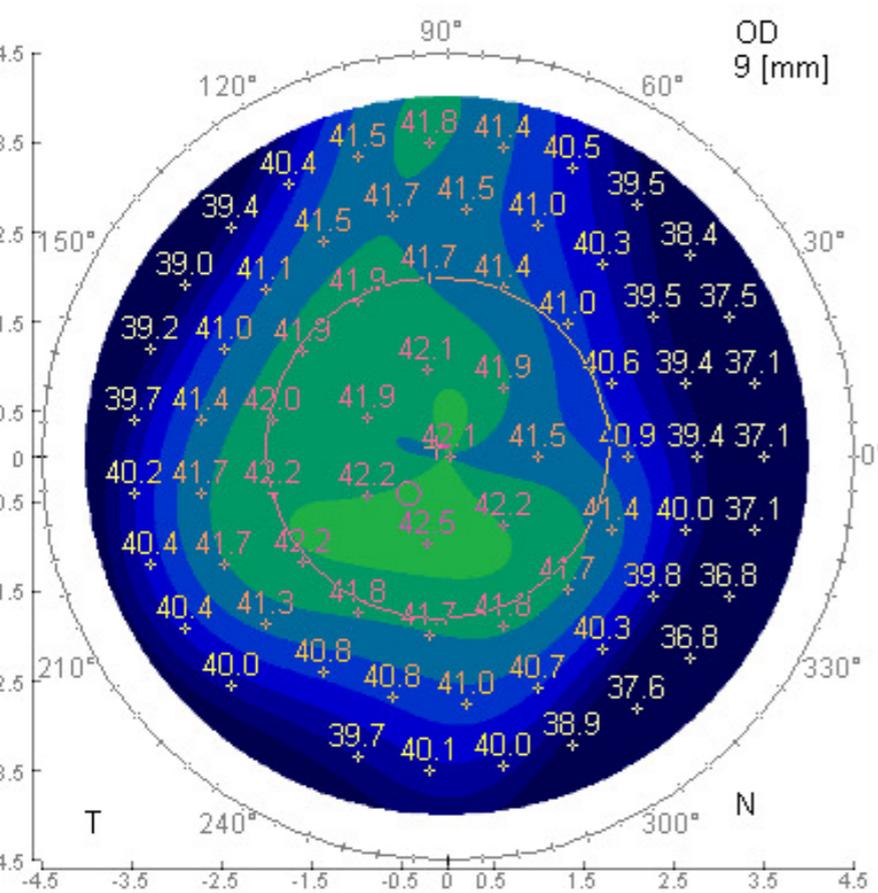
Pupil

Avg. Diameter 3.80 [mm]
Center x, y -0.12 [mm], 0.09 [mm]

Galilei Keratoconus - Ei keratokonusta

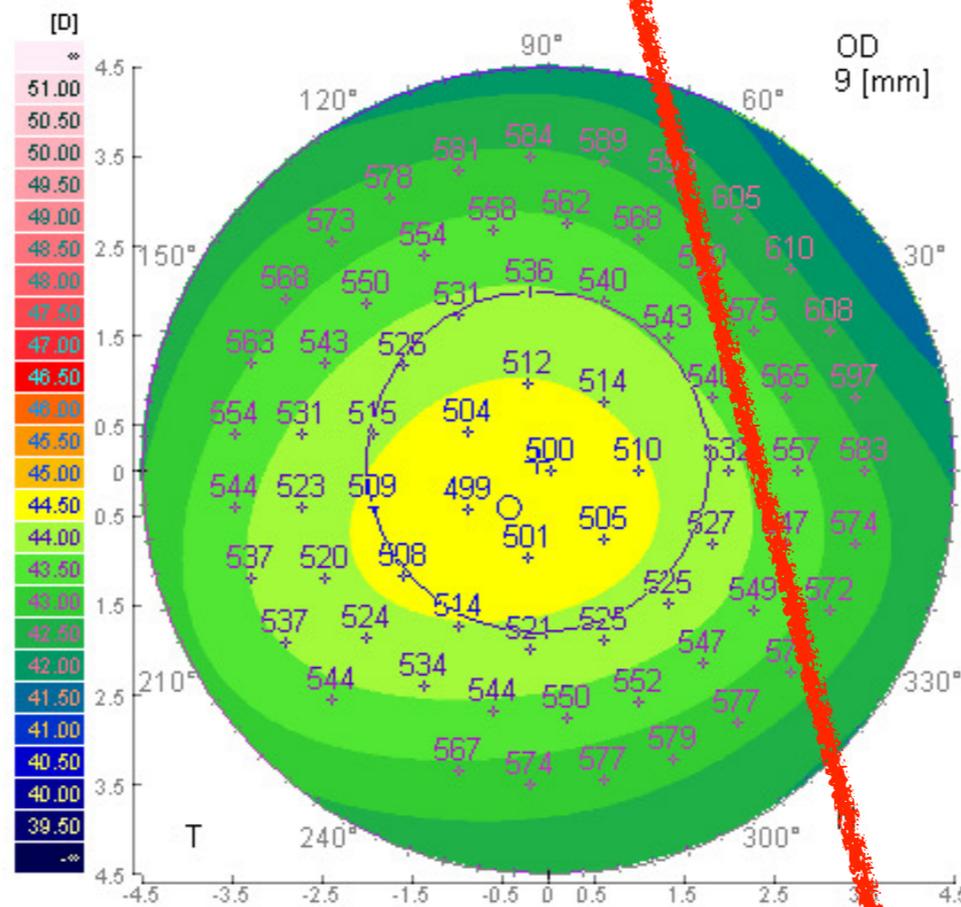
Anterior Instantaneous Curvature

n=1.3375 ROIØ=8.0 [mm]



Corneal Pachymetry

ROIØ=9.8 [mm]



SimK Values

n=1.3375 ROIØ=1-4[mm]

| | | |
|-------------|-----------|-------------|
| SimKavg | 42.05 [D] | (8.03 [mm]) |
| SimKf | 41.72 [D] | (8.09 [mm]) |
| SimKs | 42.38 [D] | (7.96 [mm]) |
| Astigmatism | 0.66 [D] | @85.0 [°] |

| | | |
|----------------------------------|------|--|
| Anterior Instantaneous Curvature | | |
| Kavg | n/a | |
| Kf | n/a | |
| Ks | n/a | |
| Astigmatism | n/a | |
| ϵ^2 | 0.15 | |

| | | |
|---------------------------|-----------|-------------|
| Posterior Axial Curvature | | |
| n=1.376 ROIØ=1-4[mm] | | |
| Kavg | -5.97 [D] | (6.70 [mm]) |
| Kf | -5.81 [D] | (6.88 [mm]) |
| Ks | -6.12 [D] | (6.54 [mm]) |
| Astigmatism | -0.30 [D] | @94.0 [°] |
| ϵ^2 | 0.25 | |

Total Corneal Power (Ray Traced)

ROIØ=1-4[mm]

| | |
|-------------|--------------------|
| Mean | 42.27 [D] |
| Flat | 42.03 [D] |
| Steep | 42.52 [D] |
| Astigmatism | 0.49 [D] @80.0 [°] |

Corneal Pachymetry

| | | |
|---------------------|------------------------|---------------|
| Central Avg. | 508 [µm] | ROIØ=0-4[mm] |
| Paracentral Avg. | 547 [µm] | ROIØ=4-7[mm] |
| Peripheral Avg. | 600 [µm] | ROIØ=7-10[mm] |
| Thinnest Pachymetry | | |
| Location x, y | -0.44 [mm], -0.41 [mm] | |
| Thickness | 498 [µm] | |

Pupil

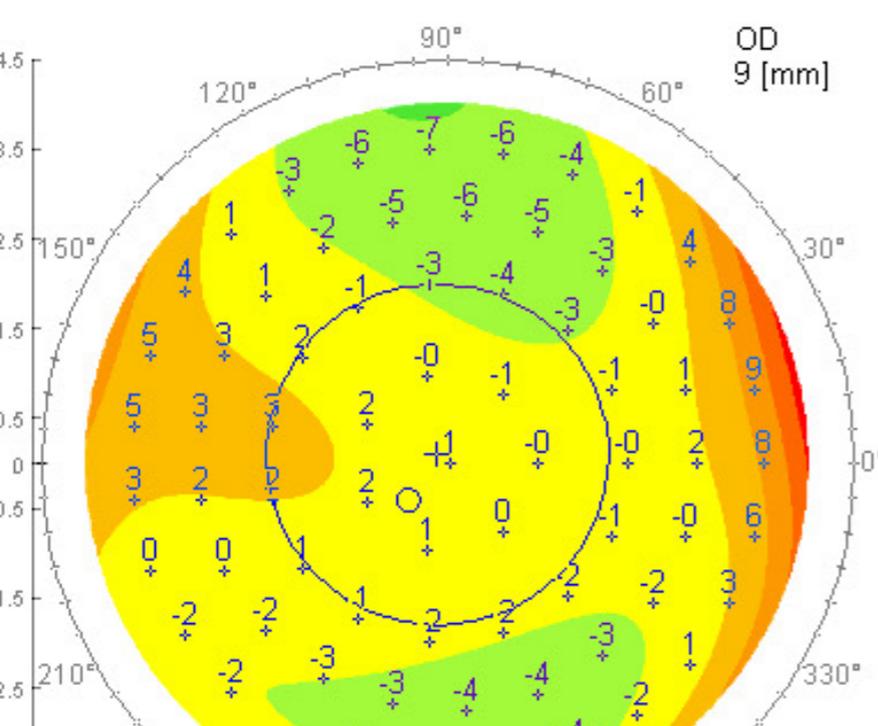
| | |
|---------------|-----------------------|
| Avg. Diameter | 3.80 [mm] |
| Center x, y | -0.12 [mm], 0.09 [mm] |

Keratoconus Indices

| | | | |
|-----|----------|-------|-----------|
| I-S | 0.06 [D] | DSI | 1.06 [D] |
| SAI | 0.38 [D] | OSI | 0.76 [D] |
| SRI | 0.36 [D] | CSI | 0.21 [D] |
| PAI | 0.38 [D] | ACP | 42.61 [D] |
| AA | 97.6% | SDP | 0.46 [D] |
| KPI | 0.0% | KProb | n/a |

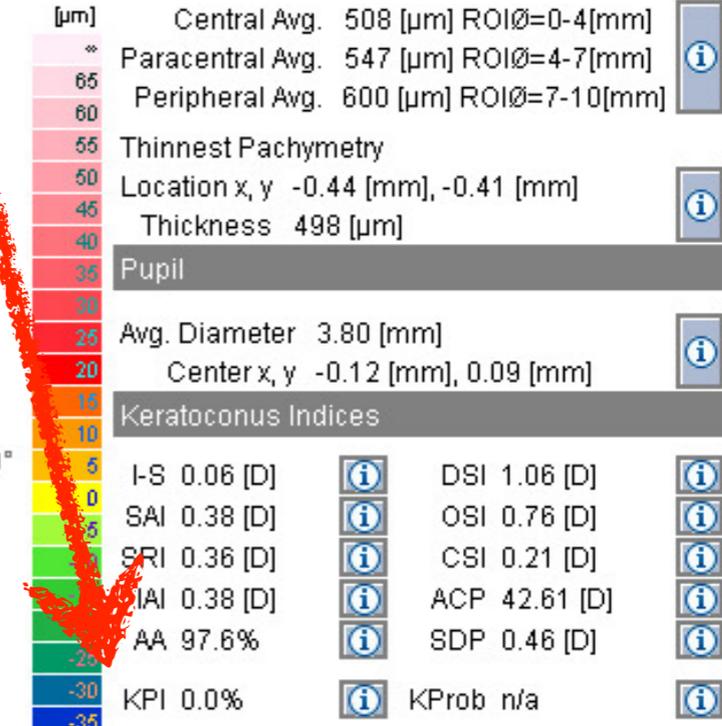
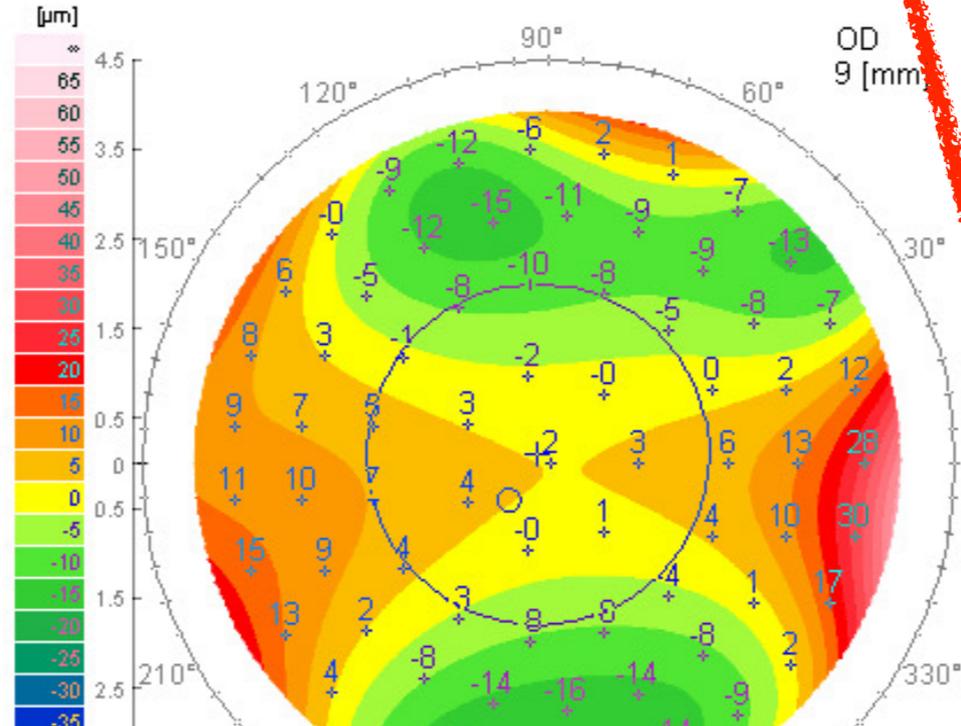
Anterior Elevation BFS

ROIØ=8.0 [mm] BFS radius=7.98 [mm]



Posterior Elevation BFS

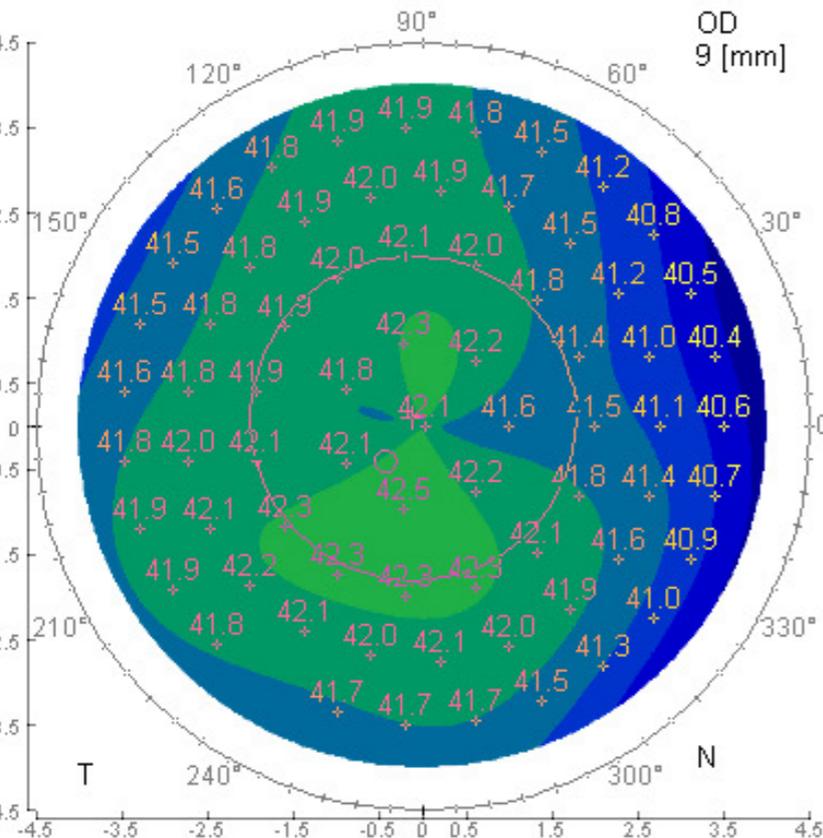
ROIØ=7.8 [mm] BFS radius=6.80 [mm]



Galilei - Refractive

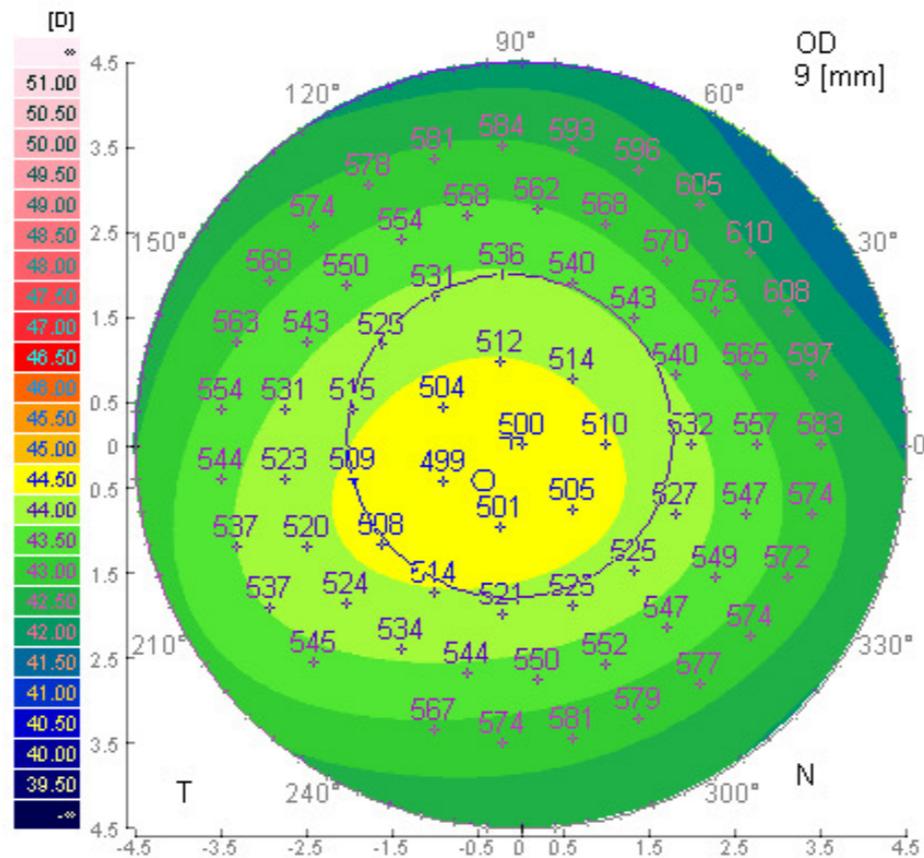
Axial Curvature

n=1.3375 ROIØ=8.0 [mm]



Corneal Pachymetry

ROIØ=9.8 [mm]



SimK Values

n=1.3375 ROIØ=1-4[mm]

SimKavg 42.05 [D] (8.03 [mm])
 SimKf 41.72 [D] (8.09 [mm])
 SimKs 42.38 [D] (7.96 [mm])
 Astigmatism 0.66 [D] @85.0 [°]

Anterior Instantaneous Curvature

Kavg n/a
 Kf n/a
 Ks n/a
 Astigmatism n/a
 ε² 0.15

Posterior Axial Curvature

n=1.376 ROIØ=1-4[mm]

Kavg -5.97 [D] (6.70 [mm])
 Kf -5.81 [D] (6.88 [mm])
 Ks -6.12 [D] (6.54 [mm])
 Astigmatism -0.30 [D] @94.0 [°]
 ε² 0.25

Total Corneal Power (Ray Traced)

ROIØ=1-4[mm]

Mean 42.27 [D]
 Flat 42.03 [D]
 Steep 42.52 [D]
 Astigmatism 0.49 [D] @80.0 [°]

Corneal Pachymetry

Central Avg. 508 [µm] ROIØ=0-4[mm]
 Paracentral Avg. 547 [µm] ROIØ=4-7[mm]
 Peripheral Avg. 600 [µm] ROIØ=7-10[mm]

Thinnest Pachymetry
 Location x, y -0.44 [mm], -0.41 [mm]
 Thickness 498 [µm]

Axial Curvature

n=1.3375
 Central Avg. 42.08 [D] ROIØ=0-4[mm]
 Paracentral Avg. 41.77 [D] ROIØ=4-7[mm]
 Peripheral Avg. 41.28 [D] ROIØ=7-10[mm]

Pupil

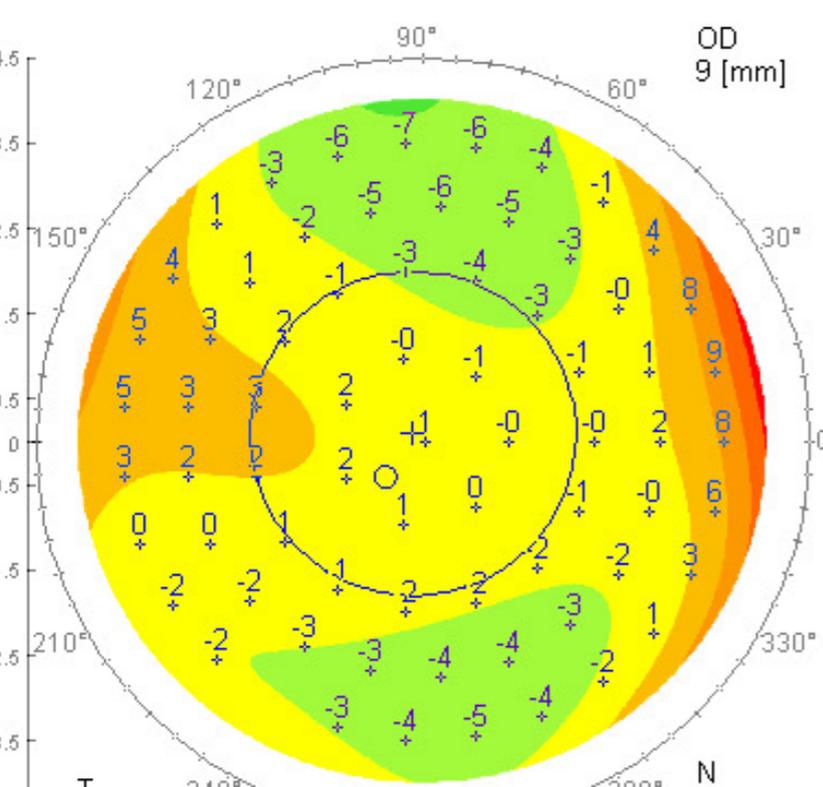
Avg. Diameter 3.80 [mm]
 Center x, y -0.12 [mm], 0.09 [mm]

Limbus

Nasal-Temporal 13.06 [mm]
 Superior-Inferior 13.18 [mm]

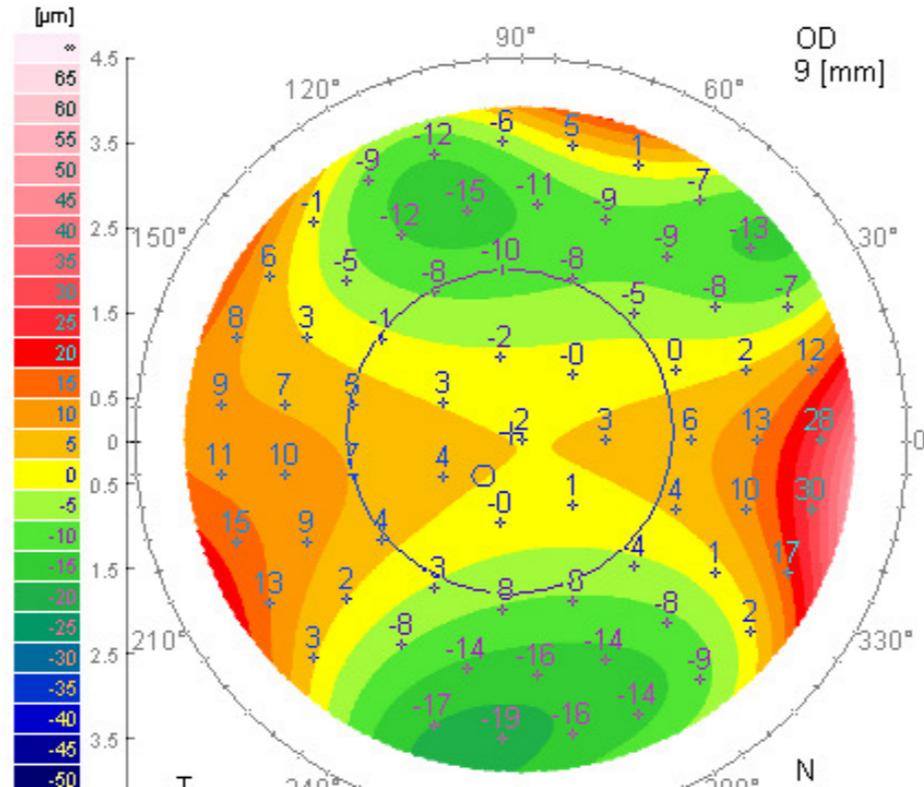
Anterior Elevation BFS

ROIØ=8.0 [mm] BFS radius=7.98 [mm]



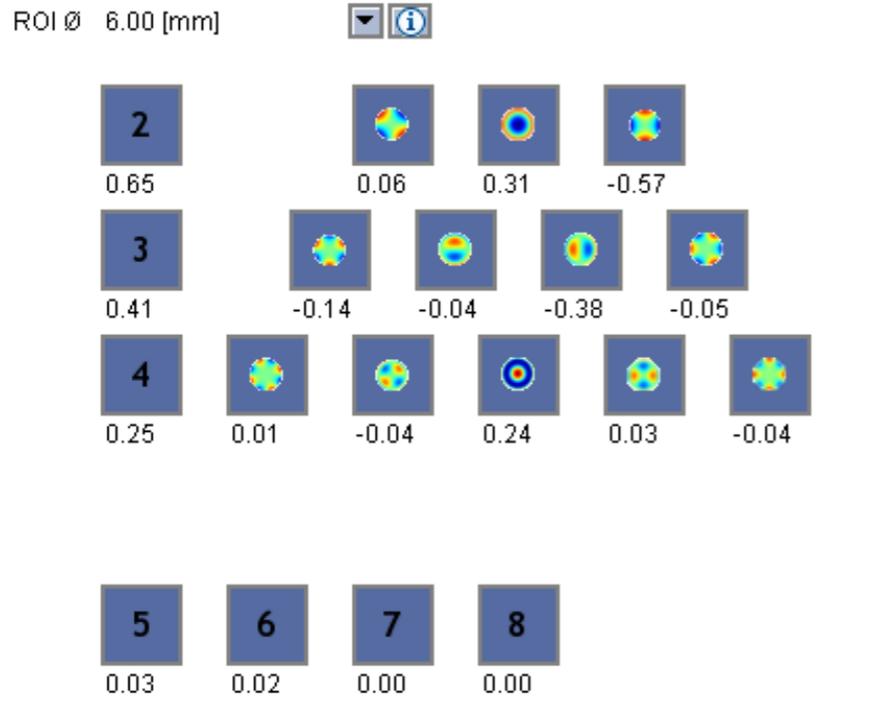
Posterior Elevation BFS

ROIØ=7.8 [mm] BFS radius=6.80 [mm]

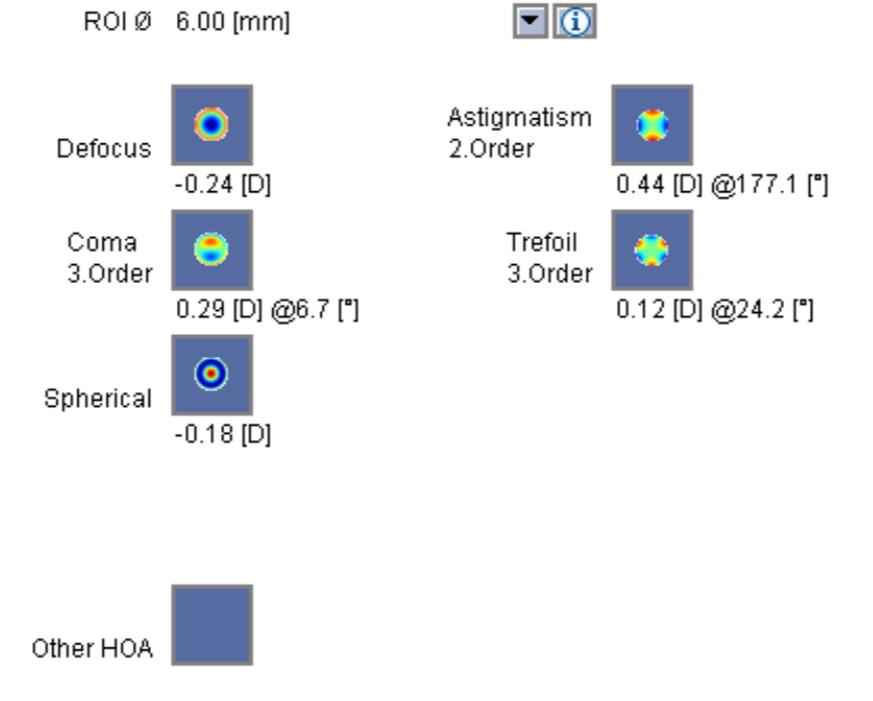


Galilei - Wavefront

Total Corneal Wavefront Zernike Coefficients [μm]



Total Corneal Wavefront Zernike Coefficients [D]



SimK Values

n=1.3375 ROI \varnothing =1-4[mm]

| | | |
|-------------|-----------|-------------|
| SimKavg | 42.05 [D] | (8.03 [mm]) |
| SimKf | 41.72 [D] | (8.09 [mm]) |
| SimKs | 42.38 [D] | (7.96 [mm]) |
| Astigmatism | 0.66 [D] | @85.0 [°] |

Anterior Instantaneous Curvature

| | |
|--------------|------|
| Kavg | n/a |
| Kf | n/a |
| Ks | n/a |
| Astigmatism | n/a |
| ϵ^2 | 0.15 |

Posterior Axial Curvature

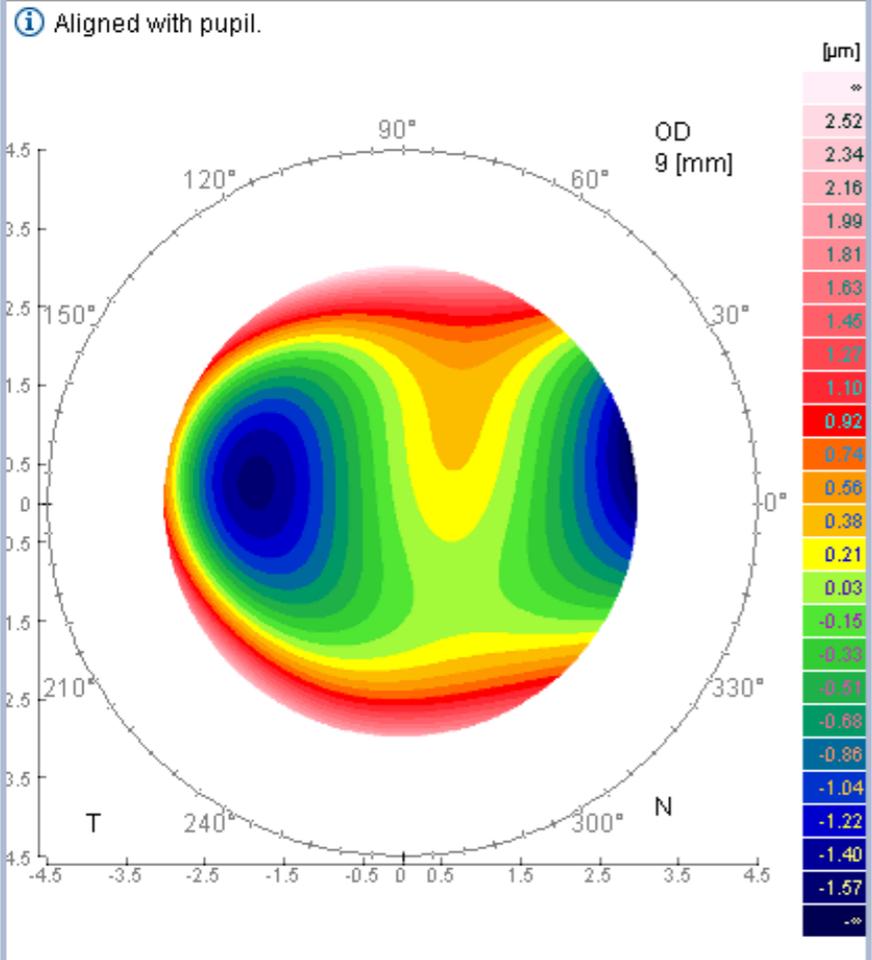
n=1.376 ROI \varnothing =1-4[mm]

| | | |
|--------------|-----------|-------------|
| Kavg | -5.97 [D] | (6.70 [mm]) |
| Kf | -5.81 [D] | (6.88 [mm]) |
| Ks | -6.12 [D] | (6.54 [mm]) |
| Astigmatism | -0.30 [D] | @94.0 [°] |
| ϵ^2 | 0.25 | |

Total Corneal Wavefront

ROI \varnothing =6.0 [mm] RMS=0.81 [μm]

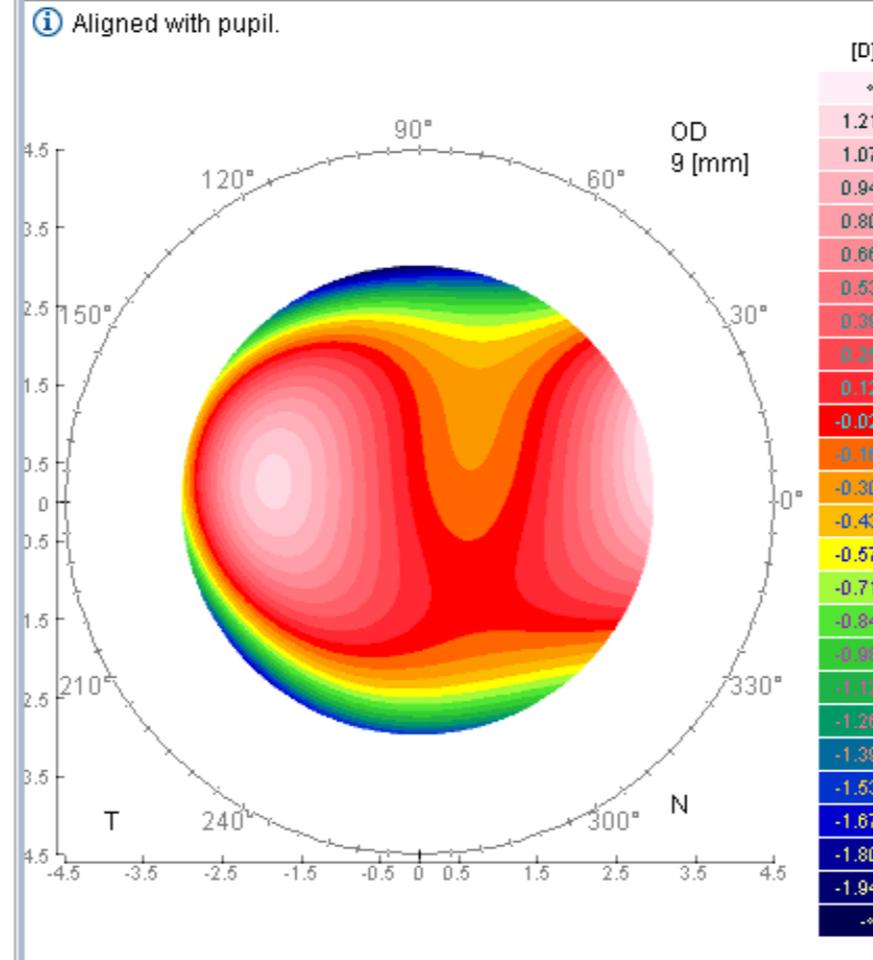
Aligned with pupil.



Total Corneal Wavefront

ROI \varnothing =6.0 [mm] RMS=0.62 [D]

Aligned with pupil.



Total Corneal Power (Ray Traced)

ROI \varnothing =1-4[mm]

| | |
|-------------|--------------------|
| Mean | 42.27 [D] |
| Flat | 42.03 [D] |
| Steep | 42.52 [D] |
| Astigmatism | 0.49 [D] @80.0 [°] |

Axial Curvature

n=1.3375

| | | |
|------------------|-----------|-----------------------------|
| Central Avg. | 42.08 [D] | ROI \varnothing =0-4[mm] |
| Paracentral Avg. | 41.77 [D] | ROI \varnothing =4-7[mm] |
| Peripheral Avg. | 41.28 [D] | ROI \varnothing =7-10[mm] |

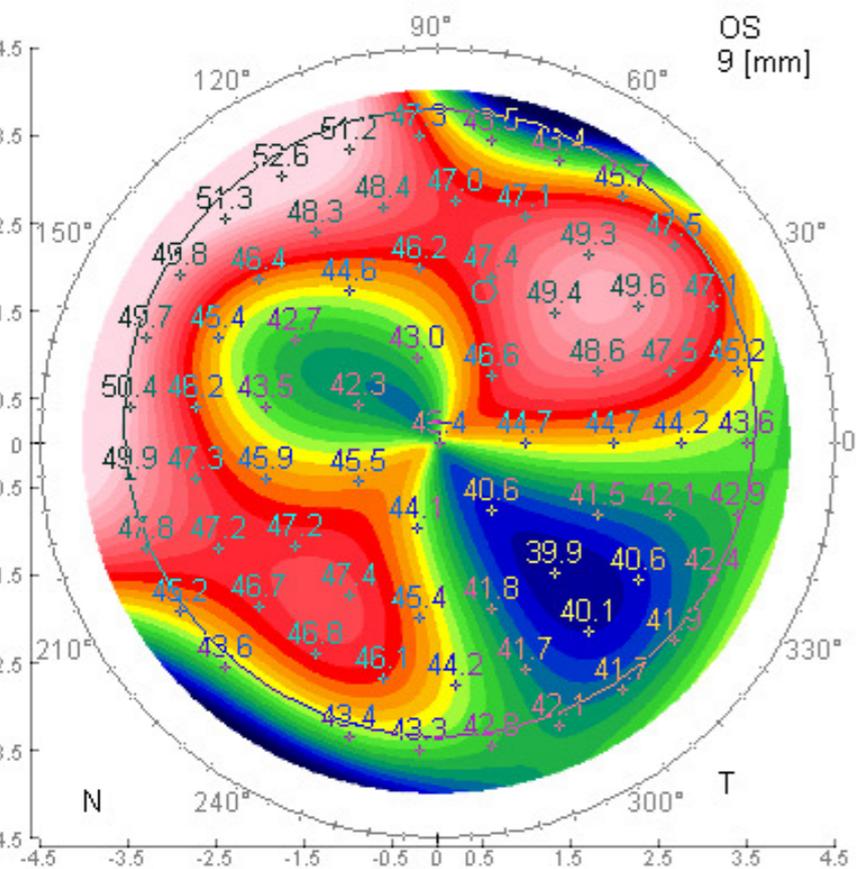
Total Corneal Wavefront

| | |
|-----------------------------|------------------------|
| RMS Total [D] | 0.62 [D] |
| RMS Total [μm] | 0.81 [μm] |

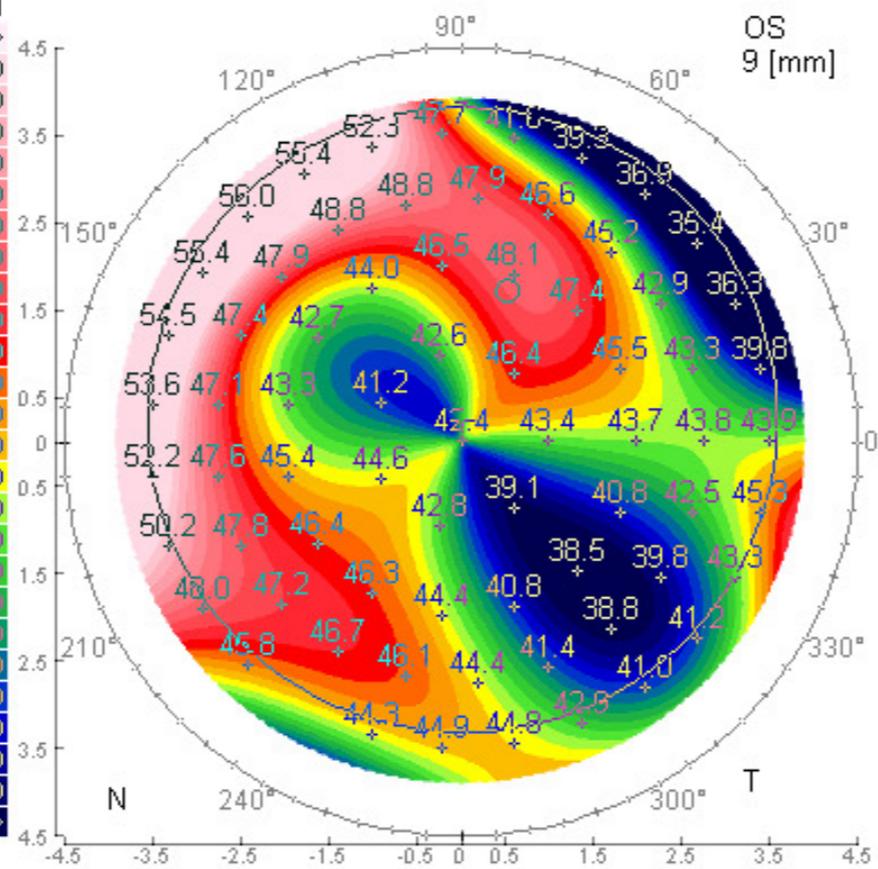
*Tapaus 1:
Sarveiskalvosiirre*

SAK-siirrännäinen, melko säännöllinen astigmatia

Axial Curvature
 n=1.3375 ROIØ=8.0 [mm]
 Quality? ?



Total Corneal Power (Ray Traced)
 ROIØ=7.8 [mm]
 Quality? ?

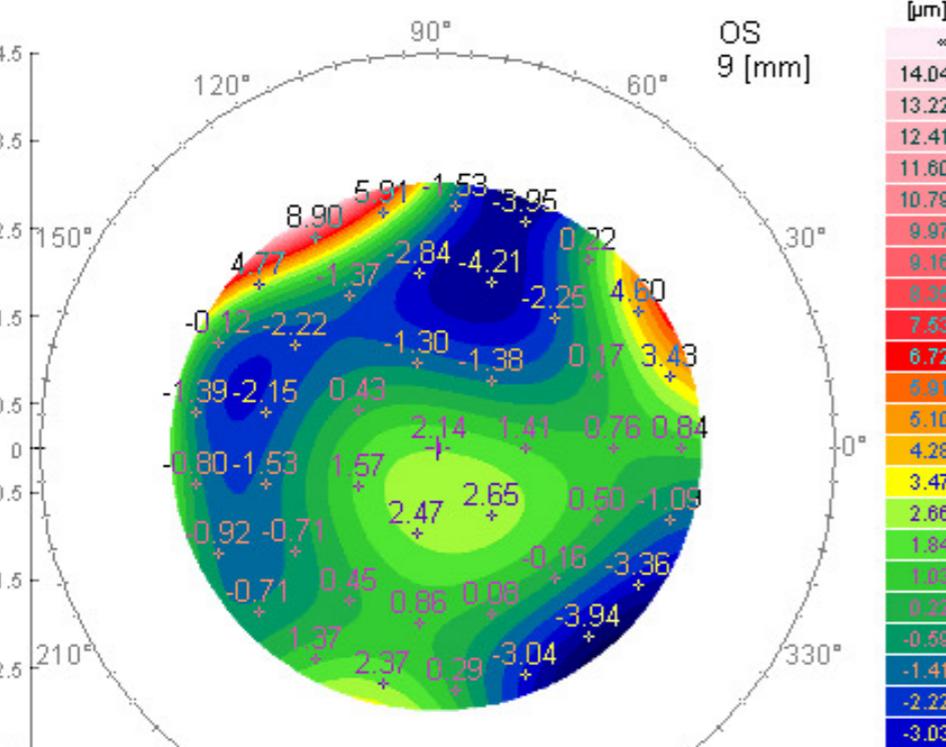


SimK Values
 n=1.3375 ROIØ=1-4[mm]

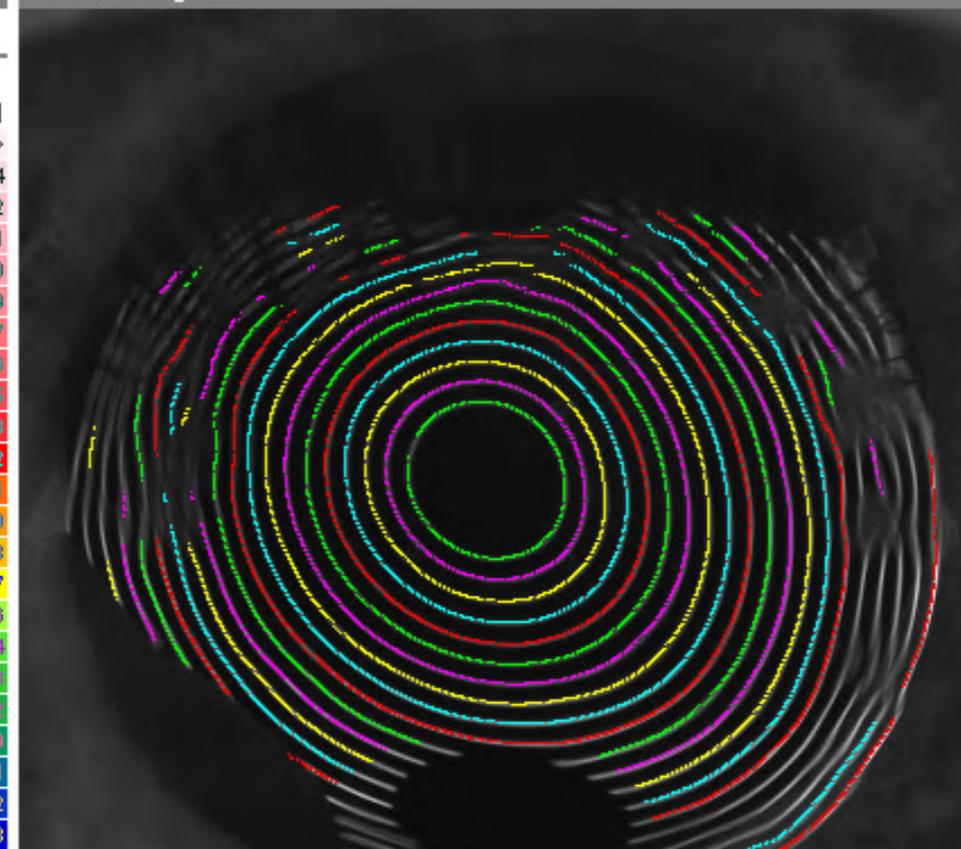
| | | |
|--|----------------------|---------------|
| SimKavg | 44.12 [D] | (7.65 [mm]) |
| SimKf | 41.27 [D] | (8.18 [mm]) |
| SimKs | 46.97 [D] | (7.19 [mm]) |
| Astigmatism | 5.69 [D] | @44.0 [°] |
| Anterior Instantaneous Curvature | | |
| n=1.3375 ROIØ=1-4[mm] | | |
| Kavg | 45.30 [D] | (7.45 [mm]) |
| Kf | 41.37 [D] | (8.16 [mm]) |
| Ks | 49.22 [D] | (6.86 [mm]) |
| Astigmatism | 7.85 [D] | @51.0 [°] |
| ϵ^2 | -0.13 | |
| Total Corneal Power (Ray Traced) | | |
| ROIØ=1-4[mm] | | |
| Mean | 43.00 [D] | |
| Flat | 40.06 [D] | |
| Steep | 45.94 [D] | |
| Astigmatism | 5.88 [D] | @46.0 [°] |
| Central Avg. | 43.01 [D] | ROIØ=0-4[mm] |
| Paracentral Avg. | 45.16 [D] | ROIØ=4-7[mm] |
| Peripheral Avg. | 45.75 [D] | ROIØ=7-10[mm] |
| Total Corneal Wavefront | | |
| n=1.376 ROIØ=6[mm] | | |
| RMS HOA | 2.41 [µm] | |
| Spherical Aberration | 0.90 [µm] | |
| Chamber (Ray Traced) | | |
| Avg. Anterior Segment Length... ...from Endothelium | n/a | |
| Avg. Anterior Chamber Depth... ...from Endothelium | n/a | |
| Volume (Ø8mm) | n/a | |
| Avg... | n/a | |
| N | n/a | n/a T |
| | n/a | |
| Limbus | | |
| Nasal-Temporal | 12.69 [mm] | |
| Superior-Inferior | 12.16 [mm] | |
| Pupil | | |
| Avg. Diameter | 7.13 [mm] | |
| Center x, y | 0.02 [mm], 0.23 [mm] | |

Total Corneal Wavefront HOA
 ROIØ=6.0 [mm] RMS=2.41 [µm]
 Quality? ?

Aligned with pupil.



Placido Image



- ▶ 60-vuotias mies, sak-siirrot 2002 o.a., retransplantaatio o.sin. 2005
Pre-op visus vasen 0,1 (-7,5 cyl -6,25 ax 145), siirrännäinen kirkas, takakapselin alainen samentuma
- ▶ IOL-Master: AL 23,70mm (UÄ),
AR 42,00@129, 47,00@39, cyl -5,0@129 corneal plane
Galilei simKf 41,27, simKs 46,97@44, cyl 5,69@44
- ▶ IOL Zeiss AT Torbi 709M +16,5 cyl +7,5 @42 IOL plane
- ▶ 10 min. post-op AR +0 cyl -1,25 ax 153 = 0,5
- ▶ 1 vko post-op: AR ±0 cyl -2,5 ax 99 = 0,8 os, 1,0+2 il
- ▶ vasemmalla sak muuttunut -> sak-pkl arvioon (ei toorista)

*Tapaus 2:
sarveiskalvosiirre*

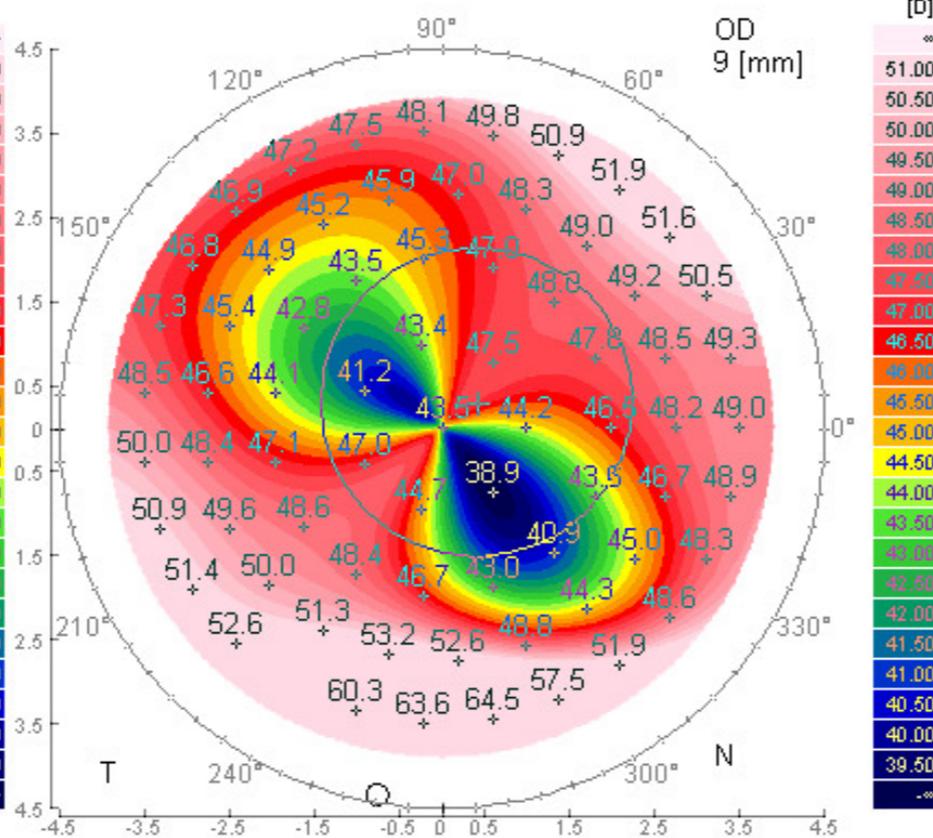
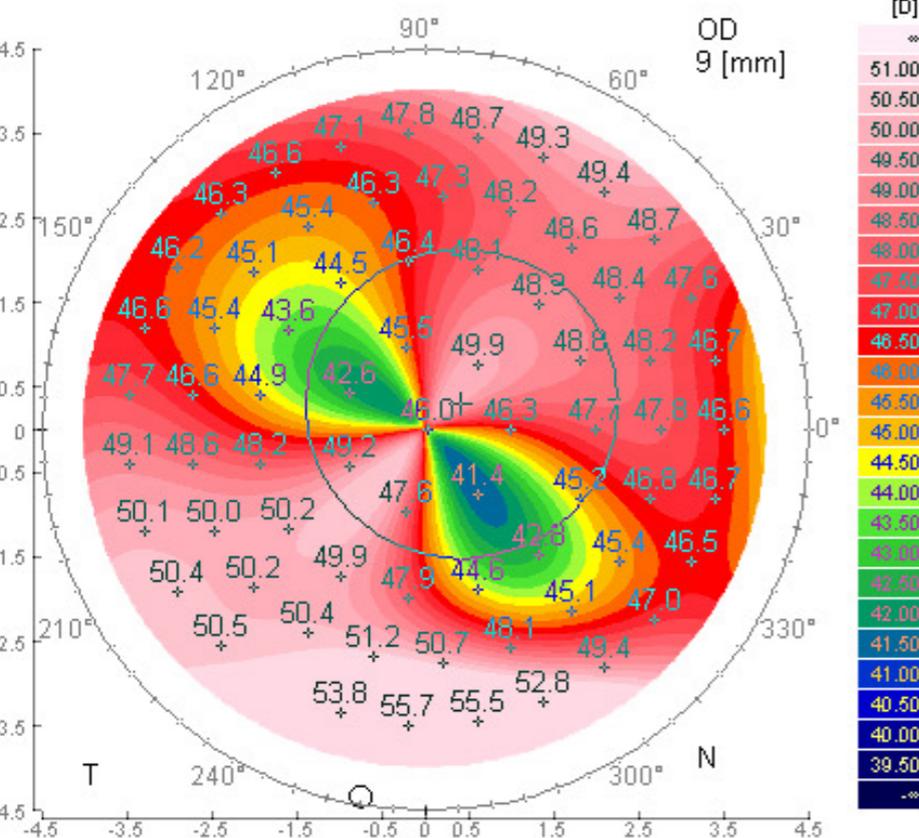
- ▶ 65-vuotias nainen, keratokonus, sak-siirrot o.sin. 1981, o.dx. 2002. Oikea heikentynyt.
- ▶ Visus oikea 0,4 (+0,75 cyl -7,75 ax 137). Siirrännäinen kirkas, runsas tumaskleroosi, silmänpohja siisti, vasen 0,25 (+2,25 cyl -7,75 ax 35). Siirrännäisessä inferiorista arpea, mykiössä vähemmän tumaskleroosia.
- ▶ Galilei...

o.dx. - melko siisti... 38.9-41.2 / 48,0-48,8

Axial Curvature
n=1.3375 ROIØ=8.0 [mm]

Total Corneal Power (Ray Traced)
ROIØ=7.8 [mm] Quality? ?

SimK Values
n=1.3375 ROIØ=1-4[mm]



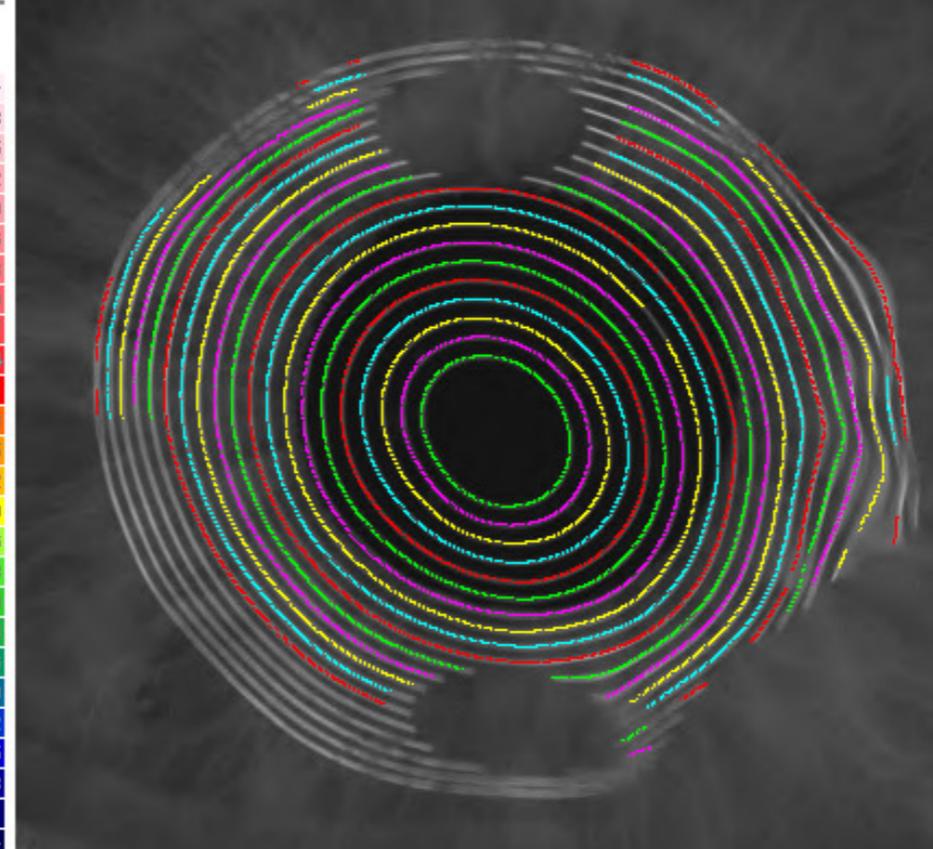
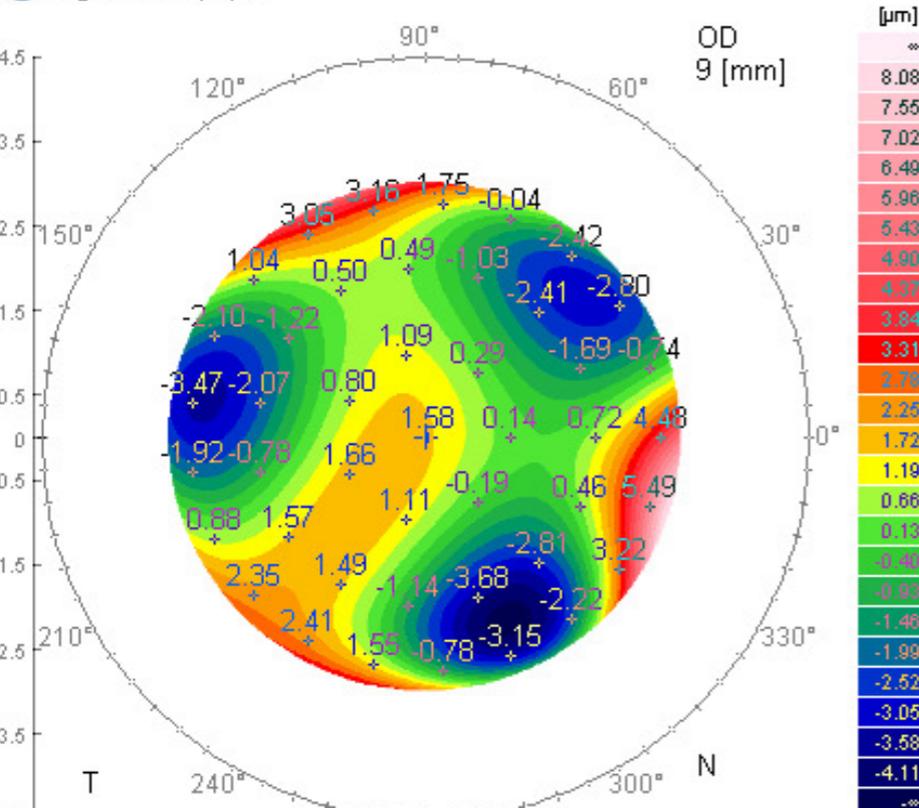
| | | |
|----------------------------------|-----------|---------------|
| SimKavg | 46.16 [D] | (7.31 [mm]) |
| SimKf | 42.17 [D] | (8.00 [mm]) |
| SimKs | 50.15 [D] | (6.73 [mm]) |
| Astigmatism | 7.98 [D] | @47.0 [°] |
| Anterior Instantaneous Curvature | | |
| n=1.3375 ROIØ=1-4[mm] | | |
| Kavg | 46.54 [D] | (7.25 [mm]) |
| Kf | 43.61 [D] | (7.74 [mm]) |
| Ks | 49.47 [D] | (6.82 [mm]) |
| Astigmatism | 5.86 [D] | @42.0 [°] |
| ϵ^2 | -0.28 | |
| Total Corneal Power (Ray Traced) | | |
| ROIØ=1-4[mm] | | |
| Mean | 44.09 [D] | |
| Flat | 40.31 [D] | |
| Steep | 47.87 [D] | |
| Astigmatism | 7.56 [D] | @45.0 [°] |
| Central Avg. | 44.10 [D] | ROIØ=0-4[mm] |
| Paracentral Avg. | 47.90 [D] | ROIØ=4-7[mm] |
| Peripheral Avg. | 52.52 [D] | ROIØ=7-10[mm] |
| Total Corneal Wavefront | | |
| n=1.376 ROIØ=6[mm] | | |
| RMS HOA | 2.01 [µm] | |
| Spherical Aberration | 0.78 [µm] | |

Total Corneal Wavefront HOA
ROIØ=6.0 [mm] RMS=2.01 [µm] Quality? ?

Placido Image

Chamber (Ray Traced)

Aligned with pupil.



| | |
|--|----------------------|
| Avg. Anterior Segment Length... ...from Endothelium | n/a |
| Avg. Anterior Chamber Depth... ...from Endothelium | 3.24 [mm] |
| Volume (Ø8mm) | 1630.2 [mm³] |
| Avg. An... | 37.0 [°] |
| T | 44.9 [°] n/a N |
| | 44.8 [°] |
| Limbus | |
| Nasal-Temporal | 12.55 [mm] |
| Superior-Inferior | 11.82 [mm] |
| Pupil | |
| Avg. Diameter | 3.66 [mm] |
| Center x, y | 0.41 [mm], 0.30 [mm] |

▶ O.dx.: pre-op visus 0,4 (+0,75 cyl -7,75 ax 137)

▶ IOL-Master: AL 24,09 mm
Galilei: SimKf 8,00m SimKs 6,73mm, cyl 7,99@47,
ACD 3,24mm

corneal plane

▶ IOL Zeiss AT Torbi 709M +10,5 cyl +10,5 @ 46
10 min. post-op: AR +1,75 cyl -3,25 ax 101 = 0,4

IOL plane

▶ 1 vko post-op: AR +1,25 cyl -3,5 ax 100 = 0,50s
R 7,93@126, 6,78@36, cyl -7,25@126

IOL repositio @ 36

10 min post-op AR +0,25 cyl -1,5 ax 129 = 0,50s
subj.: cyl -2,0 ax 130 = 0,5

▶ 2 vko myöhemmin: AR +0,25 cyl -2,0 ax 121 = 0,5
subj.: -0,25 cyl -2,5 ax 108 = 0,5

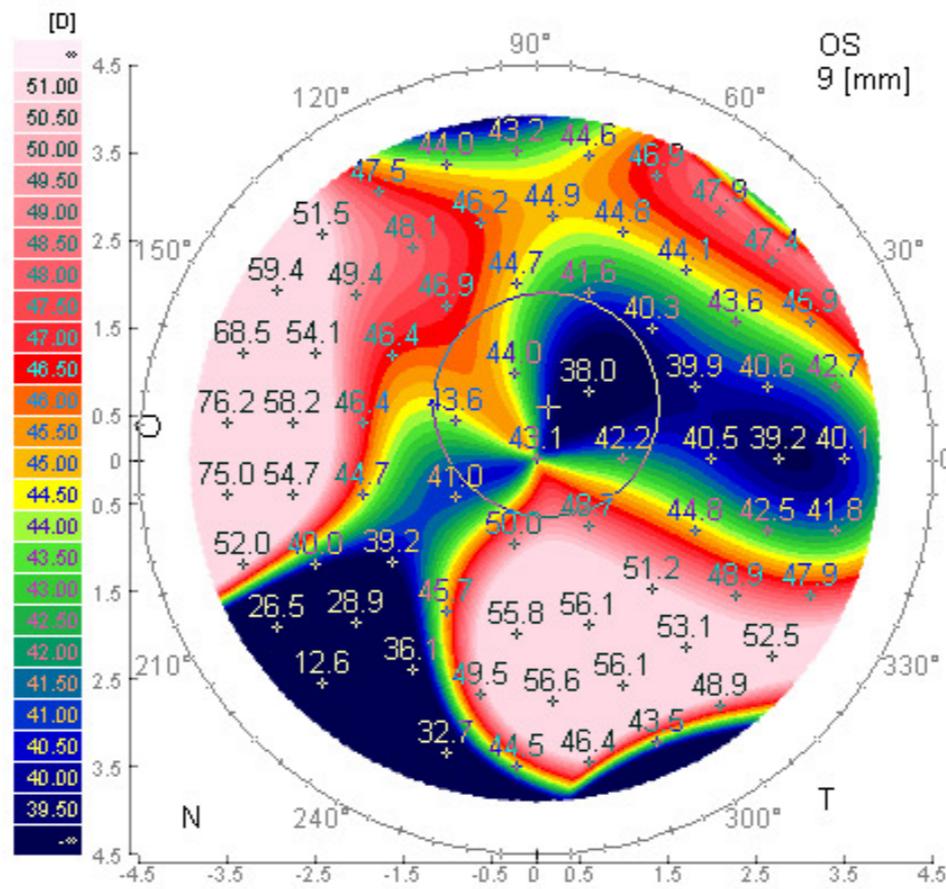
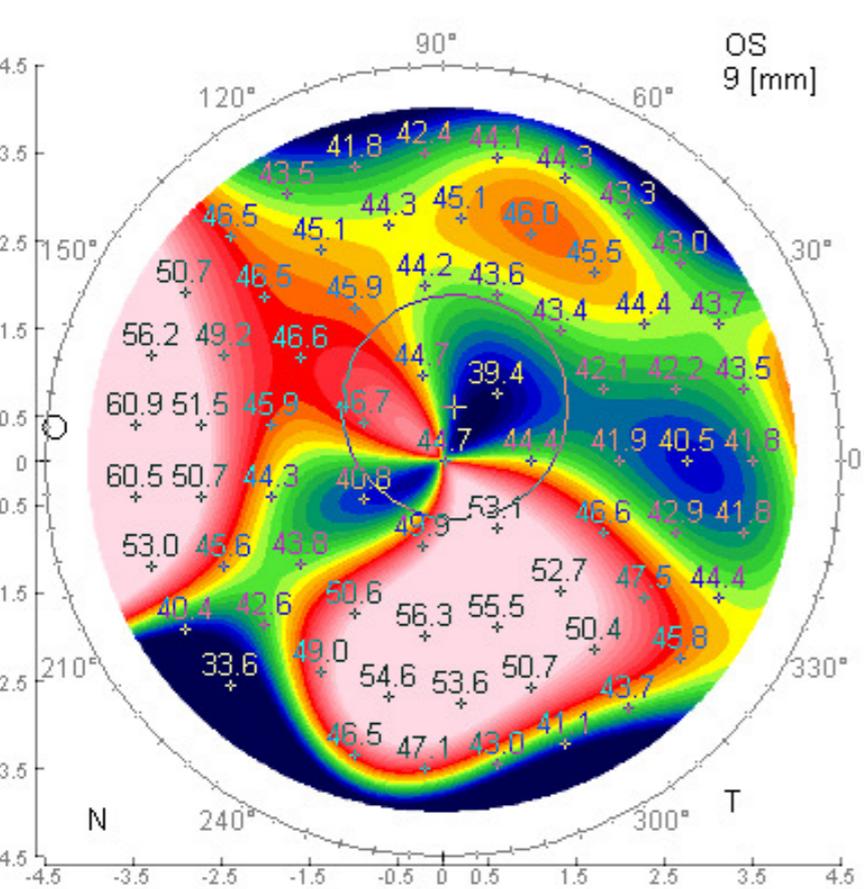
▶ Vasemmalle ei toorista? Sarveiskalvo epäsäännöllisempi...

o.sin. - epäsäännöllisempi 48.0-50.0 / 38.0-41.0

Axial Curvature
 n=1.3375 ROIØ=8.0 [mm] Quality? ?

Total Corneal Power (Ray Traced)
 ROIØ=7.8 [mm] Quality? ?

SimK Values
 n=1.3375 ROIØ=1-4[mm]

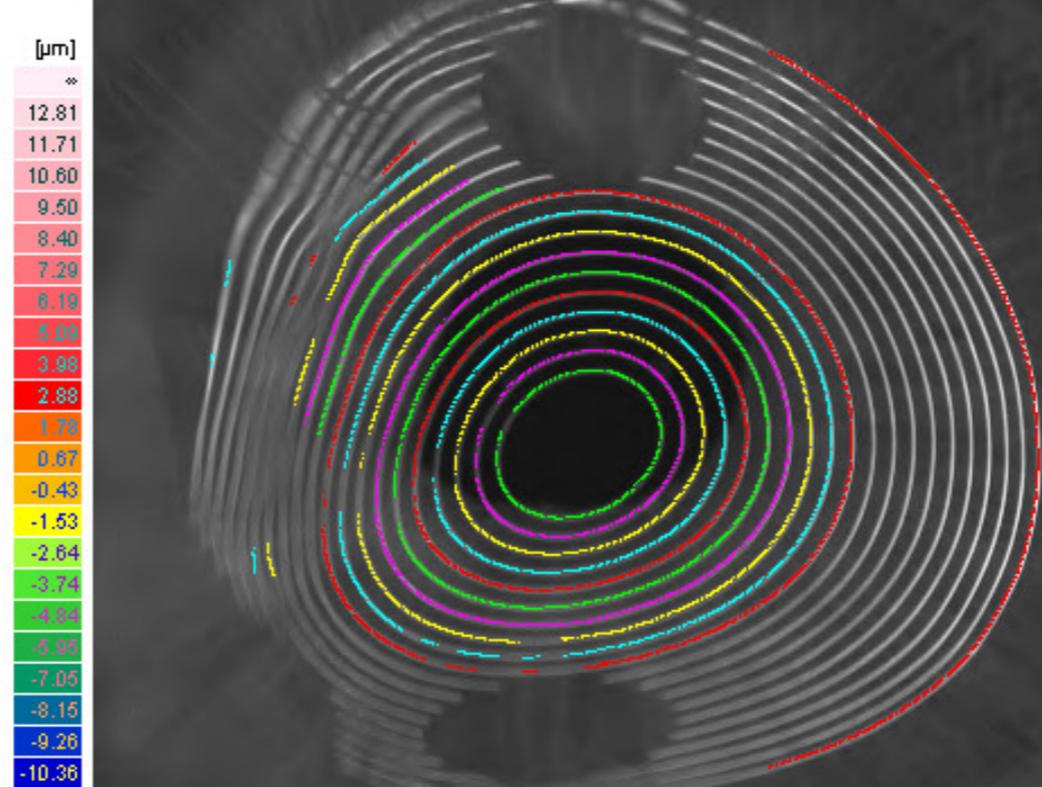
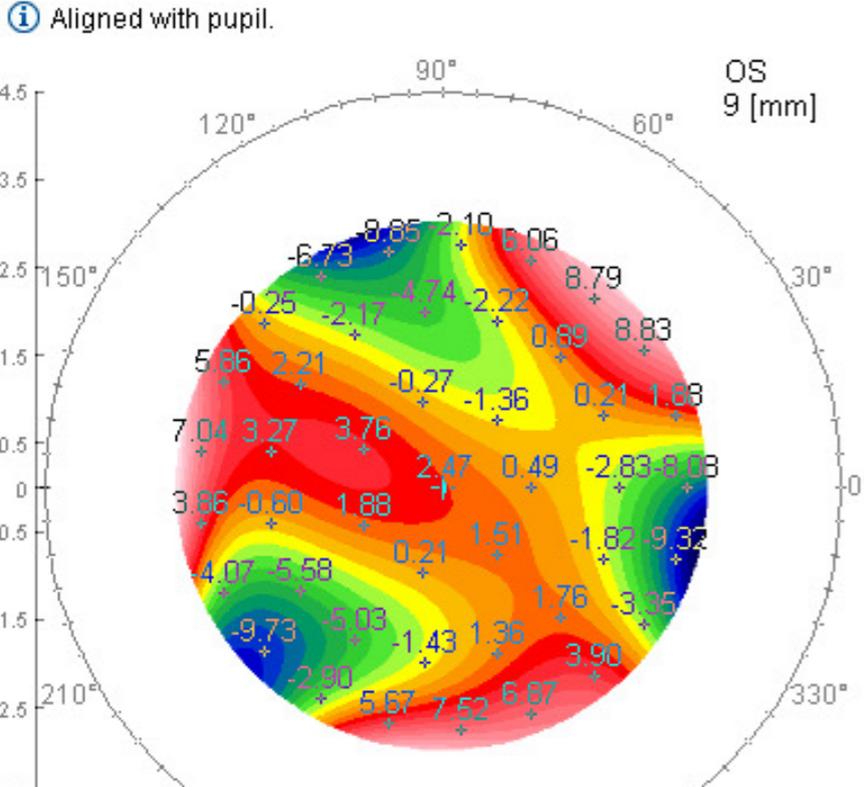


| | | |
|----------------------------------|-----------|---------------|
| SimKavg | 45.71 [D] | (7.38 [mm]) |
| SimKf | 41.02 [D] | (8.23 [mm]) |
| SimKs | 50.39 [D] | (6.70 [mm]) |
| Astigmatism | 9.36 [D] | @123.0 [°] |
| Anterior Instantaneous Curvature | | |
| n=1.3375 ROIØ=1-4[mm] | | |
| Kavg | 47.40 [D] | (7.12 [mm]) |
| Kf | 43.37 [D] | (7.78 [mm]) |
| Ks | 51.43 [D] | (6.56 [mm]) |
| Astigmatism | 8.06 [D] | @92.0 [°] |
| ϵ^2 | 0.93 | |
| Total Corneal Power (Ray Traced) | | |
| ROIØ=1-4[mm] | | |
| Mean | 44.19 [D] | |
| Flat | 40.08 [D] | |
| Steep | 48.30 [D] | |
| Astigmatism | 8.22 [D] | @118.0 [°] |
| Central Avg. | 43.96 [D] | ROIØ=0-4[mm] |
| Paracentral Avg. | 46.53 [D] | ROIØ=4-7[mm] |
| Peripheral Avg. | 45.73 [D] | ROIØ=7-10[mm] |
| Total Corneal Wavefront | | |
| n=1.376 ROIØ=6[mm] | | |
| RMS HOA | 4.33 [µm] | |
| Spherical Aberration | 0.94 [µm] | |

Total Corneal Wavefront HOA
 ROIØ=6.0 [mm] RMS=4.33 [µm] Quality? ?

Placido Image

Chamber (Ray Traced)



| | | |
|---------------------------------|----------------------|------------|
| Avg. Anterior Segment Length... | | |
| ...from Endothelium | n/a | |
| Avg. Anterior Chamber Depth... | | |
| ...from Endothelium | 2.94 [mm] | |
| Volume (Ø8mm) | 71.7 [mm³] | |
| Avg. An... n/a | | |
| N | 37.1 [°] | 41.3 [°] T |
| n/a | | |
| Limbus | | |
| Nasal-Temporal | 12.25 [mm] | |
| Superior-Inferior | 11.72 [mm] | |
| Pupil | | |
| Avg. Diameter | 2.55 [mm] | |
| Center x, y | 0.13 [mm], 0.61 [mm] | |

*Tapaus 3:
Hajataiteisuus*

▶ 73-vuotias nainen, vasemmalle phaco+IOL 02/2012.
Vasen amblyooppi?

▶ O.dx.: visus 0,63 (-2,5 cyl -6,5 ax 113). Tumaskleroosi.
O.sin.: visus 0,5 “automaatilla”... IOL

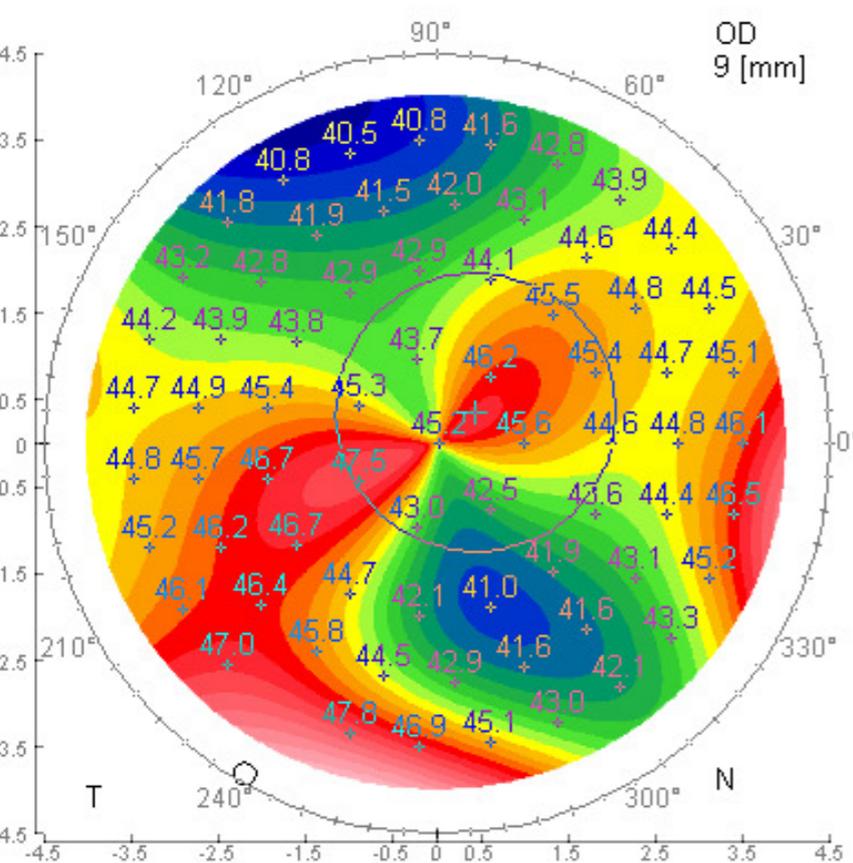
▶ Galilei: SimKf 7,94mm, SimKs 7,20@24, cyl 4,34@24 corneal plane

▶ IOL Zeiss AT Torbi 709M +12,0 cyl +6,0 @ 22 IOL plane
pre-op: AR 0,50s (-1,75 cyl -7,25 ax 111)
10 min post-op: AR 0,63-0,80s (+1,0 cyl -1,25 ax 116)

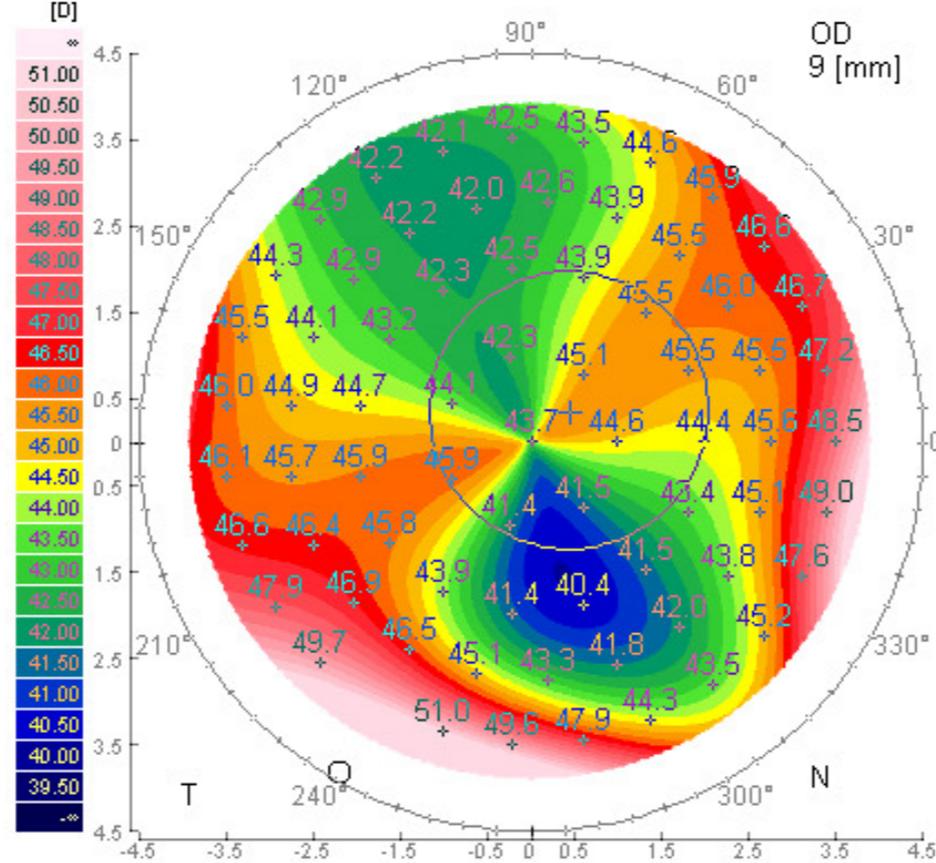
▶ 9 vrk post-op: AR 0,8 (+1,0 cyl -1,25 ax 96),
subj.: 1,0 (+1,5 cyl -1,25 ax 96)
vasen silmä: 0,5 (-0,5 cyl -4,75 ax 69) (ei toorinen IOL)

o.dx. - melko säännöllinen 40-42 / 45.5-45.9

Axial Curvature
n=1.3375 ROIØ=8.0 [mm]



Total Corneal Power (Ray Traced)
ROIØ=7.8 [mm]



SimK Values
n=1.3375 ROIØ=1-4[mm]

SimKavg 44.69 [D] (7.55 [mm])
SimKf 42.52 [D] (7.94 [mm])
SimKs 46.86 [D] (7.20 [mm])
Astigmatism 4.34 [D] @24.0 [°]

Anterior Instantaneous Curvature

n=1.3375 ROIØ=1-4[mm]

Kavg 43.80 [D] (7.70 [mm])
Kf 41.65 [D] (8.10 [mm])
Ks 45.95 [D] (7.34 [mm])
Astigmatism 4.30 [D] @25.0 [°]
 ϵ^2 0.48

Total Corneal Power (Ray Traced)

ROIØ=1-4[mm]

Mean 43.57 [D]
Flat 41.40 [D]
Steep 45.74 [D]
Astigmatism 4.34 [D] @22.0 [°]
Central Avg. 43.62 [D] ROIØ=0-4[mm]
Paracentral Avg. 44.44 [D] ROIØ=4-7[mm]
Peripheral Avg. 46.94 [D] ROIØ=7-10[mm]

Total Corneal Wavefront

n=1.376 ROIØ=6[mm]

RMS HOA 0.93 [µm]

Spherical Aberration 0.13 [µm]

Chamber (Ray Traced)

Avg. Anterior Segment Length...
...from Endothelium n/a

Avg. Anterior Chamber Depth...
...from Endothelium 3.19 [mm]

Volume (Ø8mm) 940.1 [mm³]

Avg. An... 34.1 [°]

T 40.5 [°] 37.1 [°] N

39.7 [°]

Limbus

Nasal-Temporal n/a

Superior-Inferior n/a

Pupil

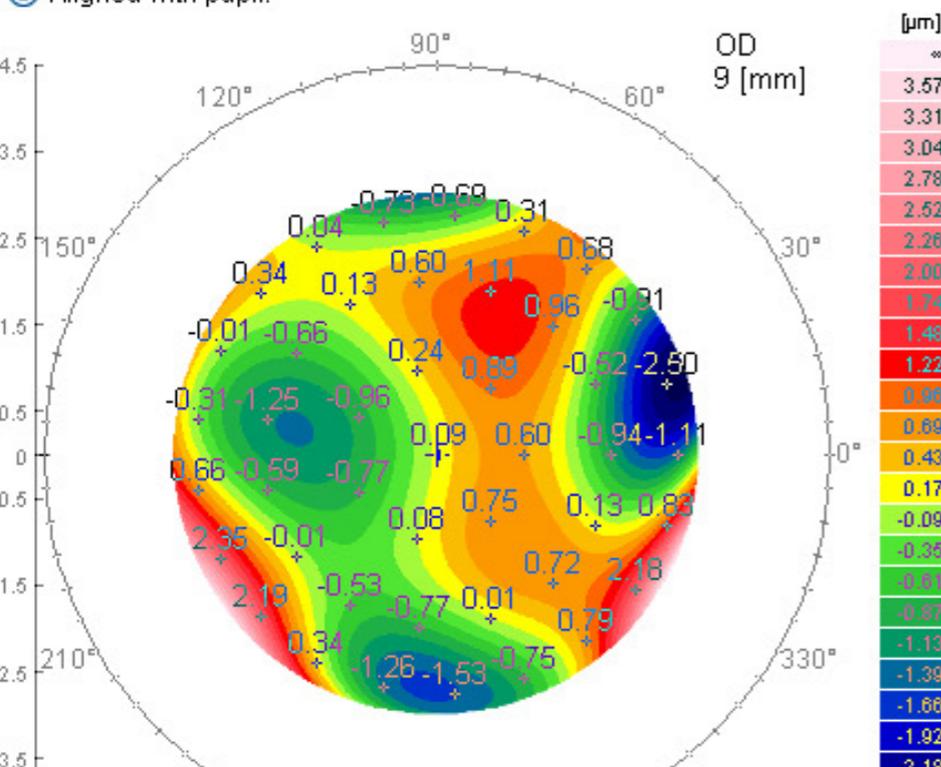
Avg. Diameter 3.21 [mm]

Center x, y 0.44 [mm], 0.36 [mm]

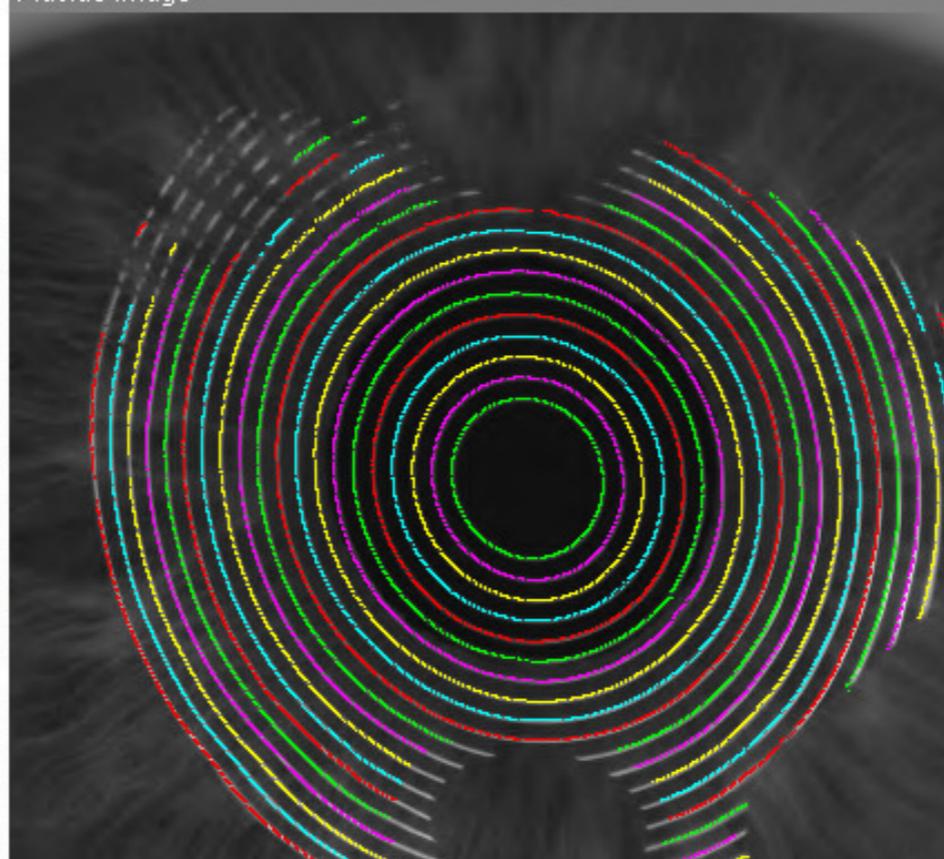
Total Corneal Wavefront HOA

ROIØ=6.0 [mm] RMS=0.93 [µm]

Aligned with pupil.



Placido Image



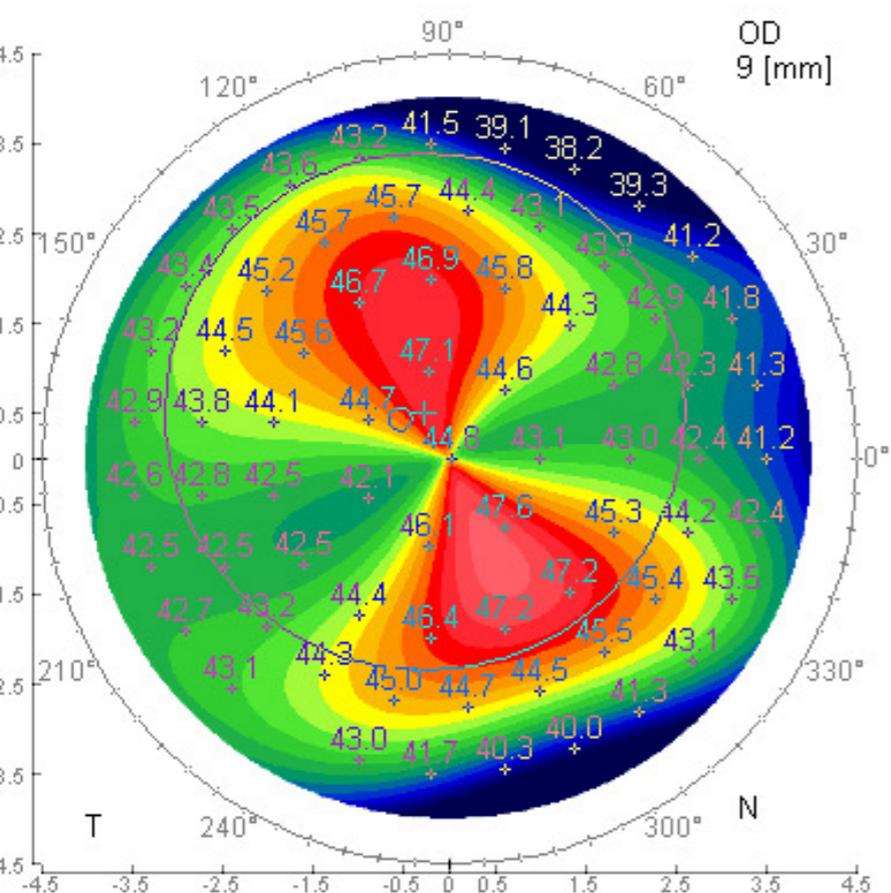
*Tapaus 4:
bilateraalinen hajataitei-
suus & leikkaus, amblyopia?*

- ▶ 73-vuotias nainen, reuma, DM (tabl.), hypertonia, kihti, endoteelidystrofia. *Ensimmäiset lasit kouluässä.*
- ▶ Pre-op. AR o.dx. 0,4 (+0,25 cyl -7,0 ax 25)
o.sin. 0,4 (+0,5 cyl -5,0 ax 159)
- ▶ IOL Alcon Acrysof IQ Toric
o.dx. SN6AT9 +16,5 cyl 6@112
o.sin. SN6AT8 +17,5 cyl 5,25@66
- ▶ 10 min. post-op. AR o.dx. +2,25 cyl **-2,0** ax 98 :-(
o.sin. +1,0 cyl **-1,5** ax 117 :-(
- ▶ 3 vko post-op. 0,6/0,6os il,
skia+subj.: 0,6 (-0,5 sph) / 0,6 (-0,5 cyl -0,5 ax 145), :-)
add +3,0 = 0,4
- ▶ Ei koskaan ole nähnyt näin hyvin ilman laseja... *Bilat. amblyopia?*

o.dx. - säännöllinen...

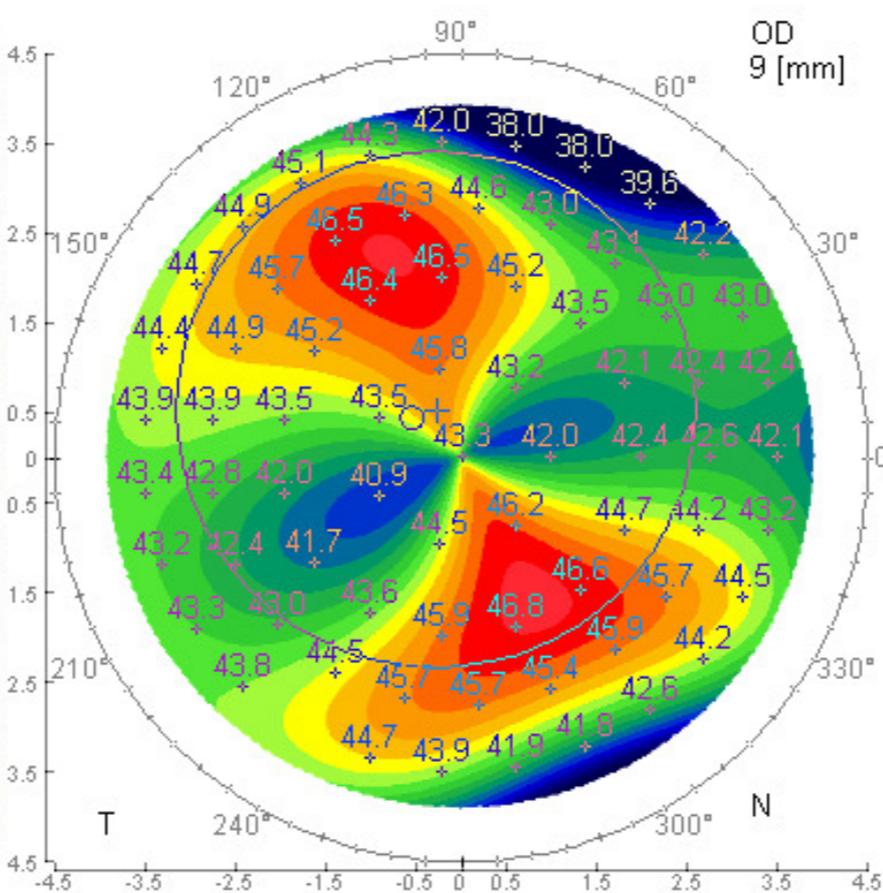
Axial Curvature Quality?

n=1.3375 ROIØ=8.0 [mm]



Total Corneal Power (Ray Traced) Quality?

ROIØ=7.8 [mm]



SimK Values

n=1.3375 ROIØ=1-4[mm]

| | | | |
|----------------------------------|-----------|-------------|--|
| SimKavg | 44.91 [D] | (7.52 [mm]) | |
| SimKf | 42.38 [D] | (7.96 [mm]) | |
| SimKs | 47.44 [D] | (7.11 [mm]) | |
| Astigmatism | 5.06 [D] | @111.0 [°] | |
| Anterior Instantaneous Curvature | | | |
| n=1.3375 ROIØ=1-4[mm] | | | |
| Kavg | 44.80 [D] | (7.53 [mm]) | |
| Kf | 42.47 [D] | (7.95 [mm]) | |
| Ks | 47.14 [D] | (7.16 [mm]) | |
| Astigmatism | 4.67 [D] | @108.0 [°] | |
| ϵ^2 | 1.20 | | |

Total Corneal Power (Ray Traced)

ROIØ=1-4[mm]

| | | |
|------------------|-----------|---------------|
| Mean | 43.77 [D] | |
| Flat | 41.29 [D] | |
| Steep | 46.24 [D] | |
| Astigmatism | 4.95 [D] | @113.0 [°] |
| Central Avg. | 43.70 [D] | ROIØ=0-4[mm] |
| Paracentral Avg. | 44.19 [D] | ROIØ=4-7[mm] |
| Peripheral Avg. | 42.27 [D] | ROIØ=7-10[mm] |

Total Corneal Wavefront

n=1.376 ROIØ=6[mm]

| | | |
|----------------------|------------|--|
| RMS HOA | 1.17 [µm] | |
| Spherical Aberration | -0.00 [µm] | |

Chamber (Ray Traced)

| | | |
|---------------------------------|--------------|--|
| Avg. Anterior Segment Length... | | |
| ...from Endothelium | n/a | |
| Avg. Anterior Chamber Depth... | | |
| ...from Endothelium | 2.93 [mm] | |
| Volume (Ø8mm) | 3531.0 [mm³] | |
| Avg. An... | n/a | |
| T | 37.5 [°] | |
| N | 31.3 [°] | |
| | n/a | |

Limbus

| | | |
|-------------------|------------|--|
| Nasal-Temporal | 12.43 [mm] | |
| Superior-Inferior | 12.15 [mm] | |

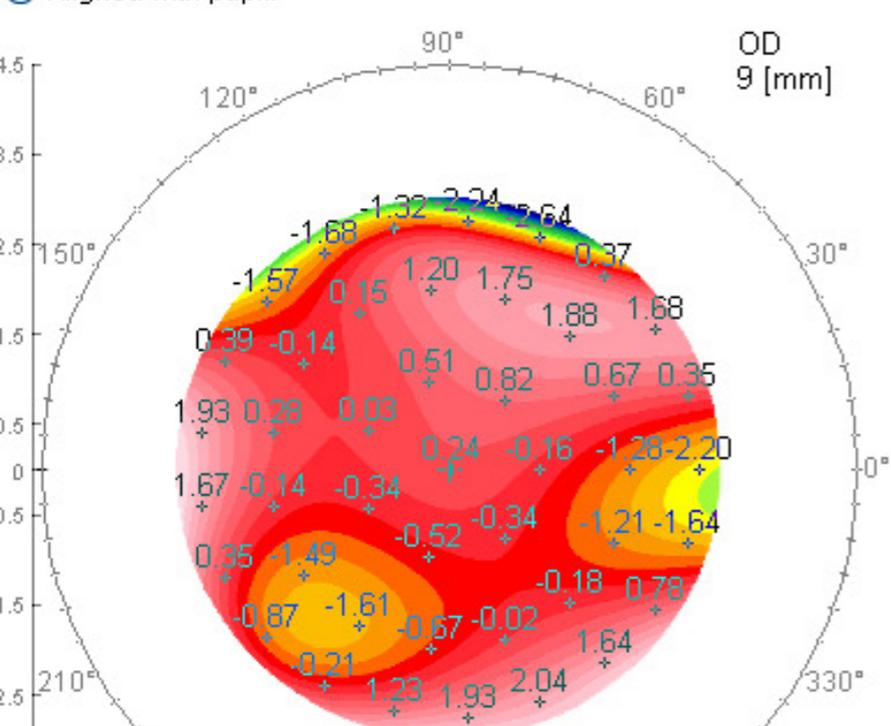
Pupil

| | | |
|---------------|-----------------------|--|
| Avg. Diameter | 5.74 [mm] | |
| Center x, y | -0.28 [mm], 0.52 [mm] | |

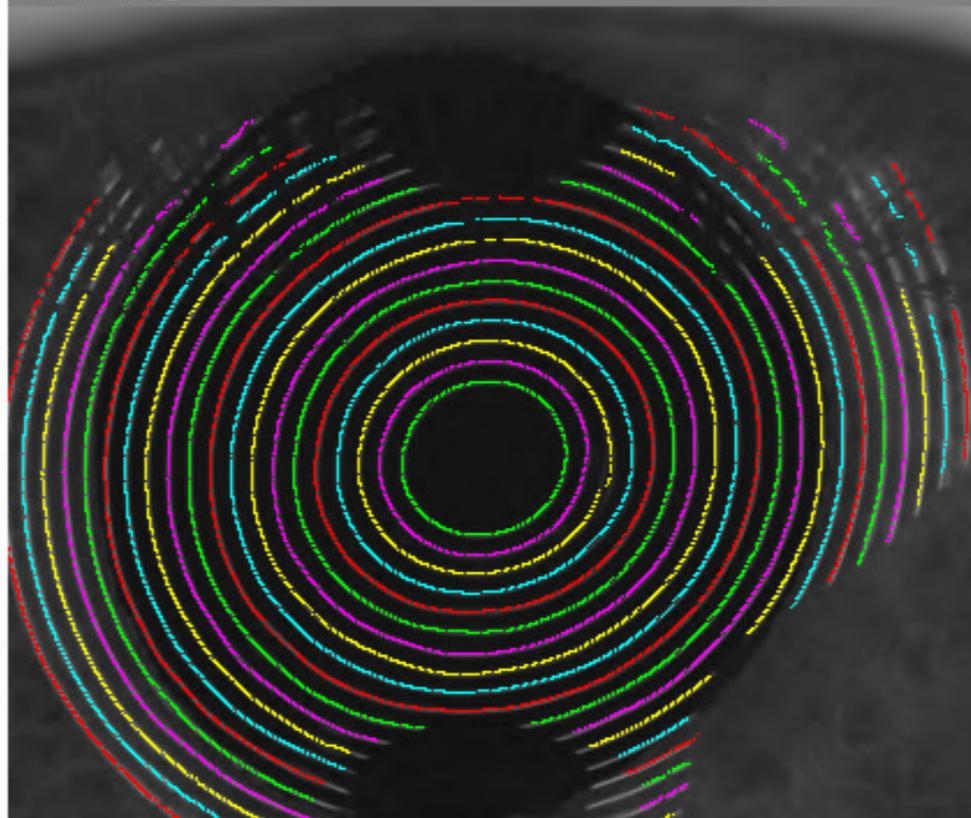
Total Corneal Wavefront HOA Quality?

ROIØ=6.0 [mm] RMS=1.17 [µm]

Aligned with pupil.



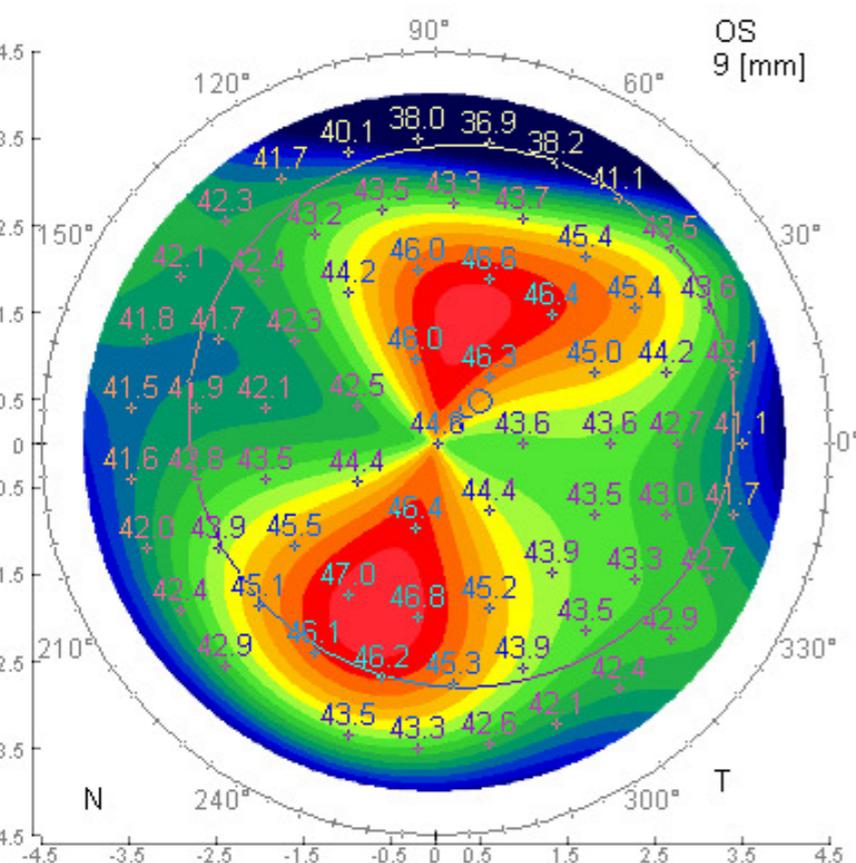
Placido Image



o.sin. - säännöllinen...

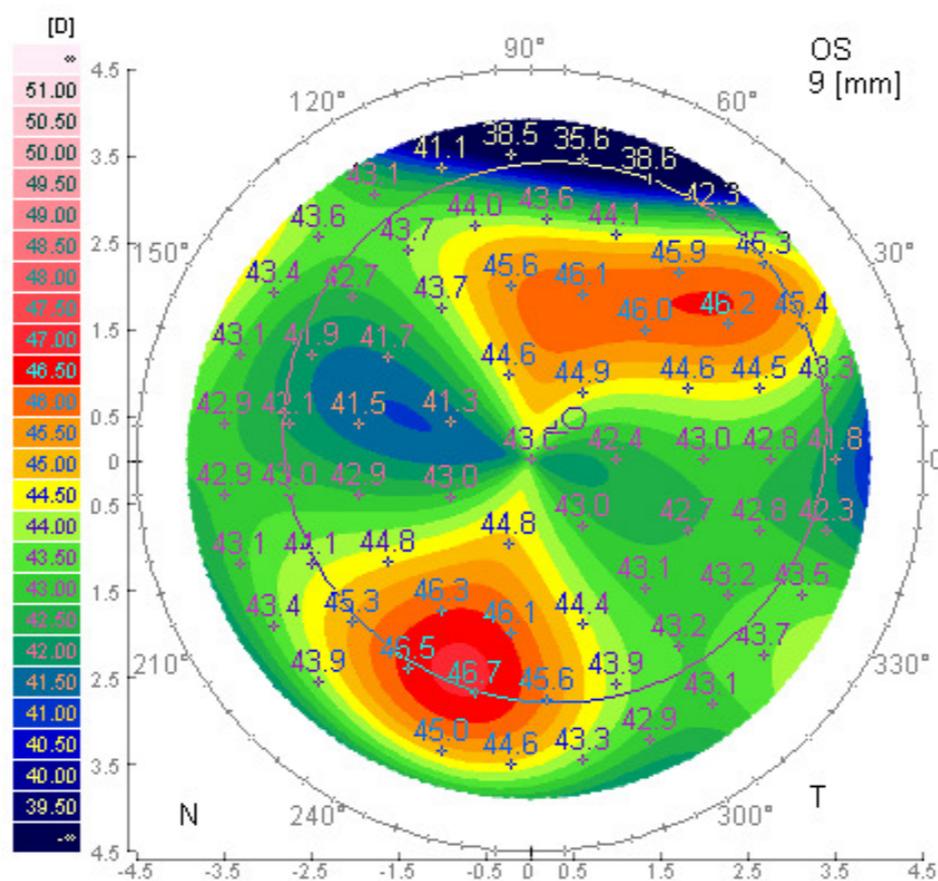
Axial Curvature Quality? ?

n=1.3375 ROIØ=8.0 [mm]



Total Corneal Power (Ray Traced) Quality? ?

ROIØ=7.8 [mm]



SimK Values Quality? ?

n=1.3375 ROIØ=1-4[mm]

| | | |
|----------------------------------|-----------|-------------|
| SimKavg | 44.84 [D] | (7.53 [mm]) |
| SimKf | 42.95 [D] | (7.86 [mm]) |
| SimKs | 46.73 [D] | (7.22 [mm]) |
| Astigmatism | 3.77 [D] | @74.0 [°] |
| Anterior Instantaneous Curvature | | |
| n=1.3375 ROIØ=1-4[mm] | | |
| Kavg | 44.84 [D] | (7.53 [mm]) |
| Kf | 42.53 [D] | (7.94 [mm]) |
| Ks | 47.16 [D] | (7.16 [mm]) |
| Astigmatism | 4.63 [D] | @69.0 [°] |
| ϵ^2 | 0.90 | |

Total Corneal Power (Ray Traced) ?

ROIØ=1-4[mm]

| | |
|------------------|-------------------------|
| Mean | 43.63 [D] |
| Flat | 41.85 [D] |
| Steep | 45.41 [D] |
| Astigmatism | 3.57 [D] @74.0 [°] |
| Central Avg. | 43.46 [D] ROIØ=0-4[mm] |
| Paracentral Avg. | 43.96 [D] ROIØ=4-7[mm] |
| Peripheral Avg. | 42.07 [D] ROIØ=7-10[mm] |

Total Corneal Wavefront

| | |
|----------------------|------------|
| n=1.376 ROIØ=6[mm] | |
| RMS HOA | 1.33 [µm] |
| Spherical Aberration | -0.08 [µm] |

Chamber (Ray Traced)

| | |
|---------------------------------|------------|
| Avg. Anterior Segment Length... | |
| ...from Endothelium | n/a |
| Avg. Anterior Chamber Depth... | |
| ...from Endothelium | 2.81 [mm] |
| Volume (Ø8mm) | n/a |
| Avg. An... | n/a |
| N | 36.6 [°] |
| | 34.9 [°] T |
| | 34.3 [°] |

Limbus

| | |
|-------------------|------------|
| Nasal-Temporal | 12.49 [mm] |
| Superior-Inferior | 12.62 [mm] |

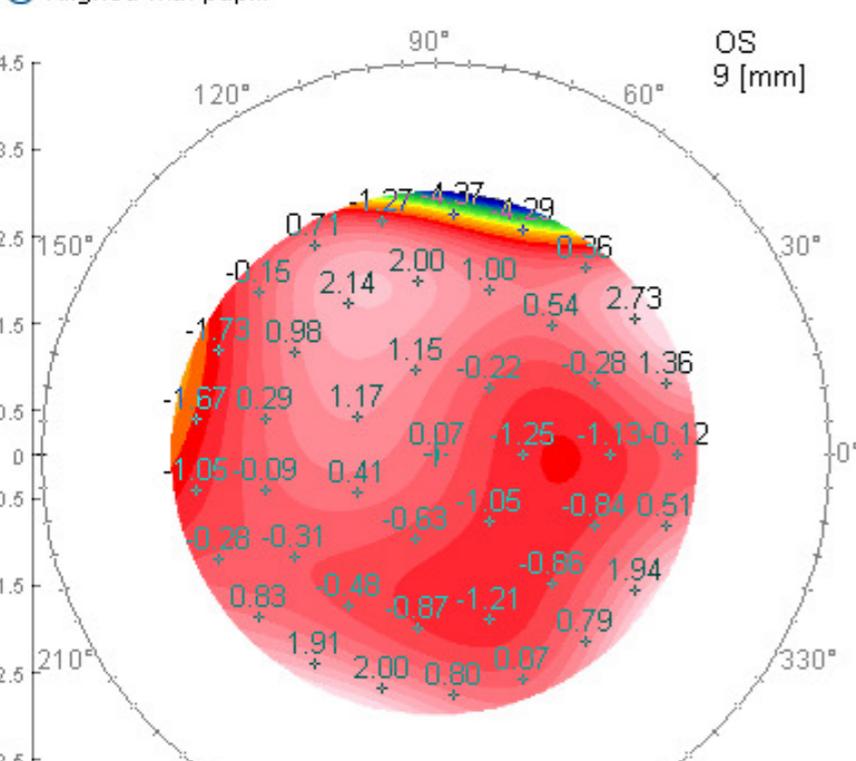
Pupil

| | |
|---------------|----------------------|
| Avg. Diameter | 6.22 [mm] |
| Center x, y | 0.29 [mm], 0.31 [mm] |

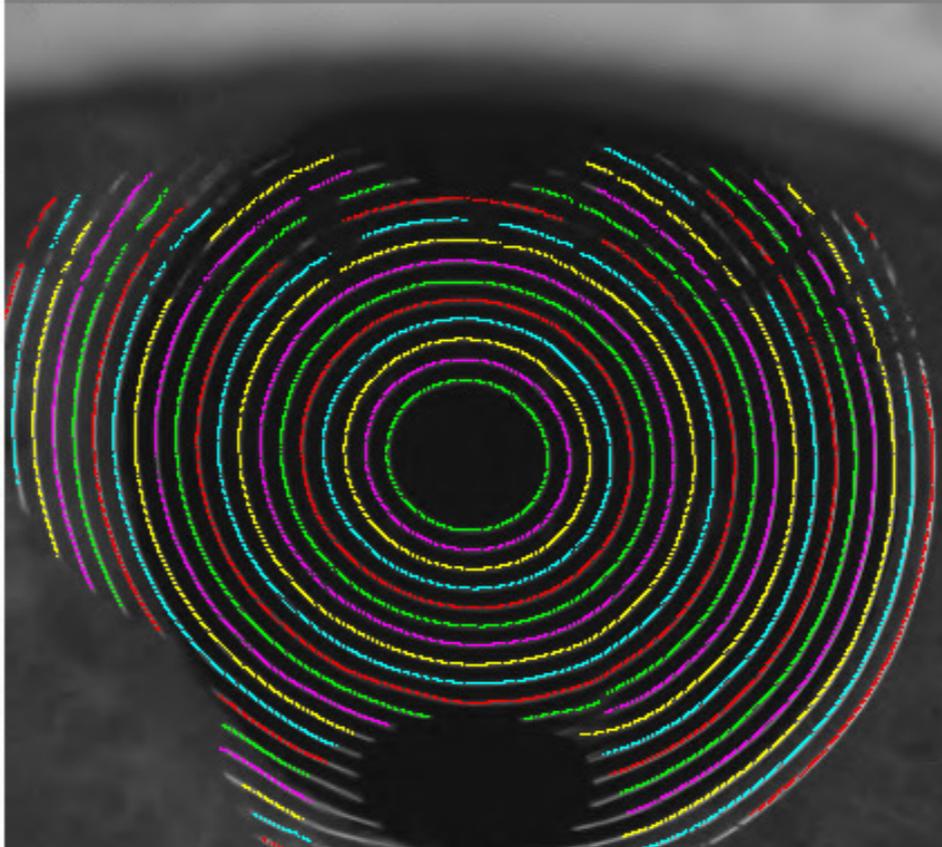
Total Corneal Wavefront HOA Quality? ?

ROIØ=6.0 [mm] RMS=1.33 [µm]

Aligned with pupil.



Placido Image



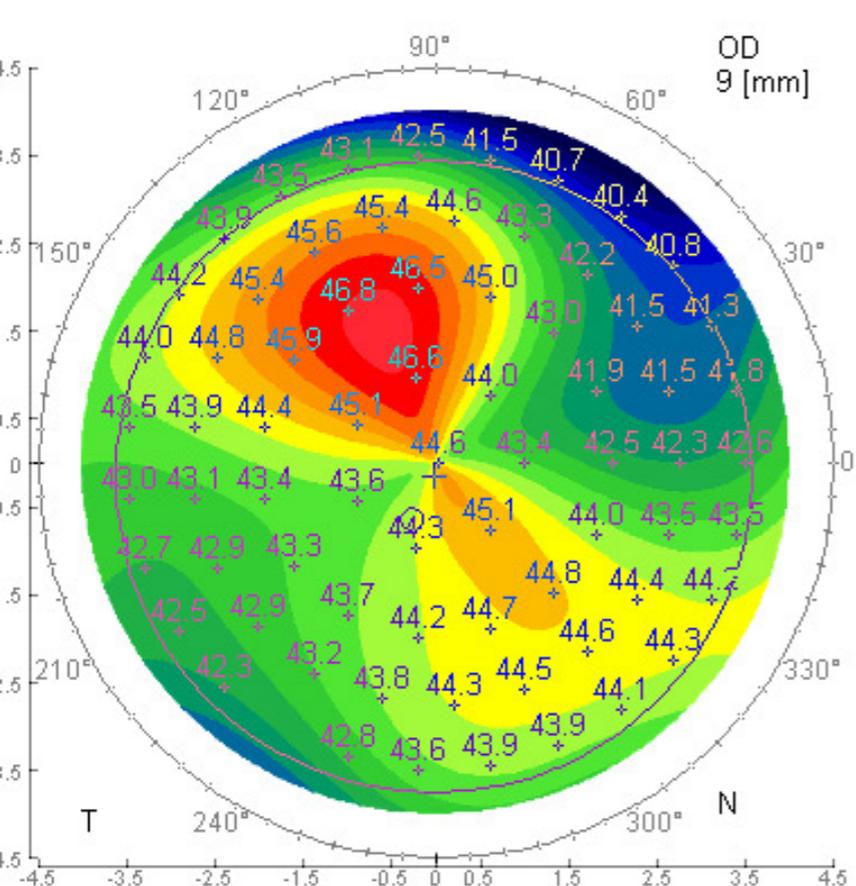
*Tapaus 5:
myopia & hajataitto,
glaukooma*

- ▶ 68-vuotias nainen, myopia, myooppiset papillat, glaukooma, lähes totaali yläkentän puutos o.a., OCT: makulat kuivat
- ▶ Pre-op. visus o.dx. 0,25 (-13,25 cyl -4,25 ax 29)
o.sin. 0,32 (-9,0 cyl -4,75 cyl 167)
- ▶ IOL-Master:
oikea AL 25,99 mm, R 7,89@25, 7,29@115, cyl -3,52@25
vasen AL 25,52 mm, R 7,94@168, 7,30@78, cyl -3,72@168
- ▶ Galilei:
oikea simKf 7,83, simKs 7,36@115, cyl 2,74@115
vasen simKf 8,02, simKs 7,25@80, cyl 4,48@80
- ▶ IOL Zeiss AT Torbi 709M
oikea +10,0 cyl +3,0 @ 119
vasen +10,5 cyl +5,0 ax 79

o.dx. - 44.8-46.8 / 41.9-43.3

Axial Curvature

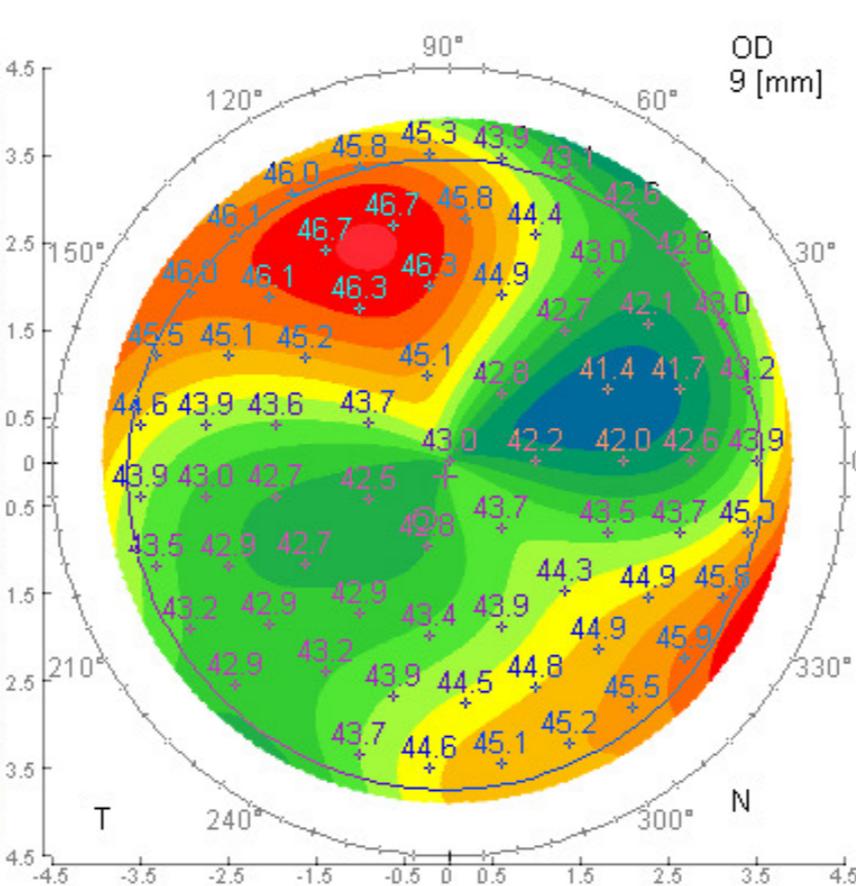
n=1.3375 ROIØ=8.0 [mm]



Total Corneal Power (Ray Traced)

ROIØ=7.8 [mm]

Quality? ?



SimK Values

n=1.3375 ROIØ=1-4[mm]

SimKavg 44.47 [D] (7.59 [mm])
 SimKf 43.10 [D] (7.83 [mm])
 SimKs 45.84 [D] (7.36 [mm])
 Astigmatism 2.74 [D] @115.0 [°]

Anterior Instantaneous Curvature

n=1.3375 ROIØ=1-4[mm]

Kavg 44.07 [D] (7.66 [mm])
 Kf 42.31 [D] (7.98 [mm])
 Ks 45.83 [D] (7.36 [mm])
 Astigmatism 3.52 [D] @114.0 [°]
 ϵ^2 0.40

Total Corneal Power (Ray Traced)

ROIØ=1-4[mm]

Mean 43.29 [D]
 Flat 42.04 [D]
 Steep 44.53 [D]
 Astigmatism 2.49 [D] @115.0 [°]
 Central Avg. 43.25 [D] ROIØ=0-4[mm]
 Paracentral Avg. 44.07 [D] ROIØ=4-7[mm]
 Peripheral Avg. 44.46 [D] ROIØ=7-10[mm]

Total Corneal Wavefront

n=1.376 ROIØ=6[mm]

RMS HOA 0.99 [µm]

Spherical Aberration 0.18 [µm]

Chamber (Ray Traced)

Avg. Anterior Segment Length...

...from Endothelium 5.09 [mm]

Avg. Anterior Chamber Depth...

...from Endothelium 2.99 [mm]

Volume (Ø8mm) n/a

Avg. An... n/a

T 47.7 [°] 35.9 [°] N

n/a

Limbus

Nasal-Temporal 11.95 [mm]

Superior-Inferior 11.87 [mm]

Pupil

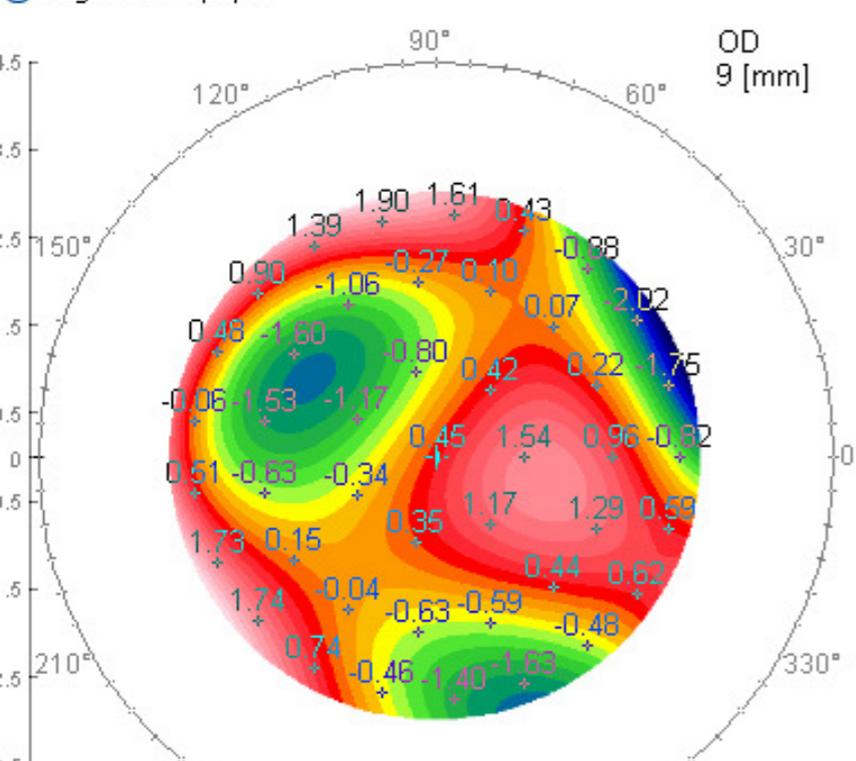
Avg. Diameter 7.19 [mm]

Center x, y -0.04 [mm], -0.16 [mm]

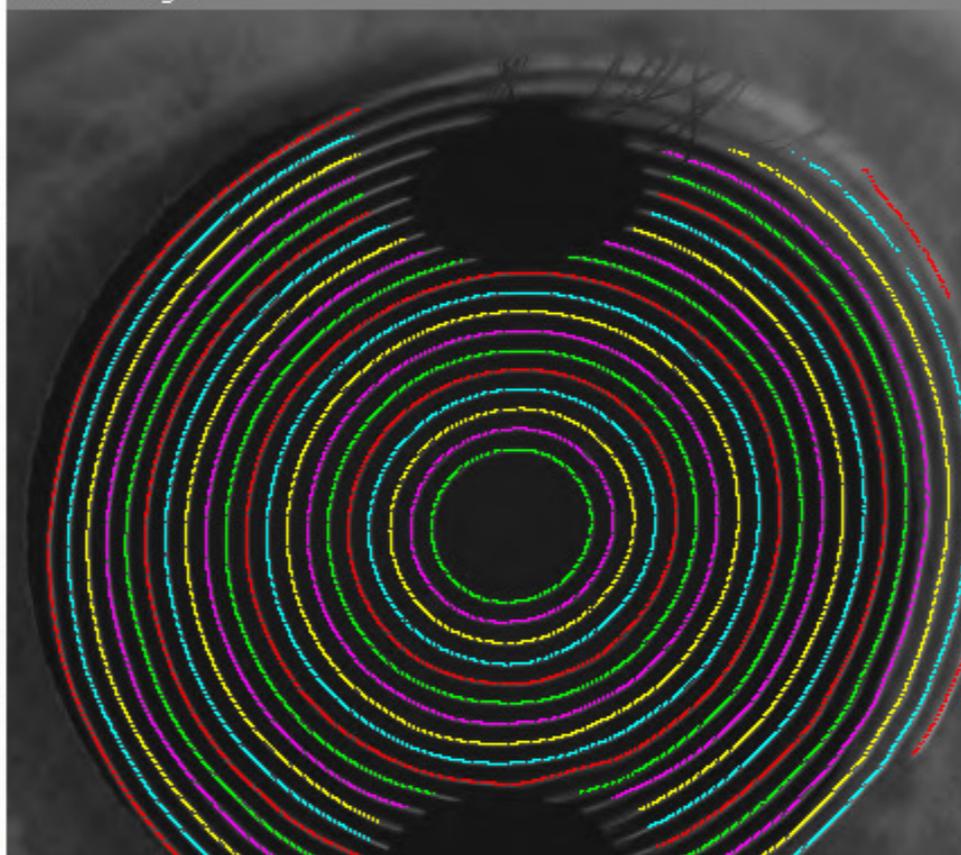
Total Corneal Wavefront HOA

ROIØ=6.0 [mm] RMS=0.99 [µm]

Aligned with pupil.



Placido Image

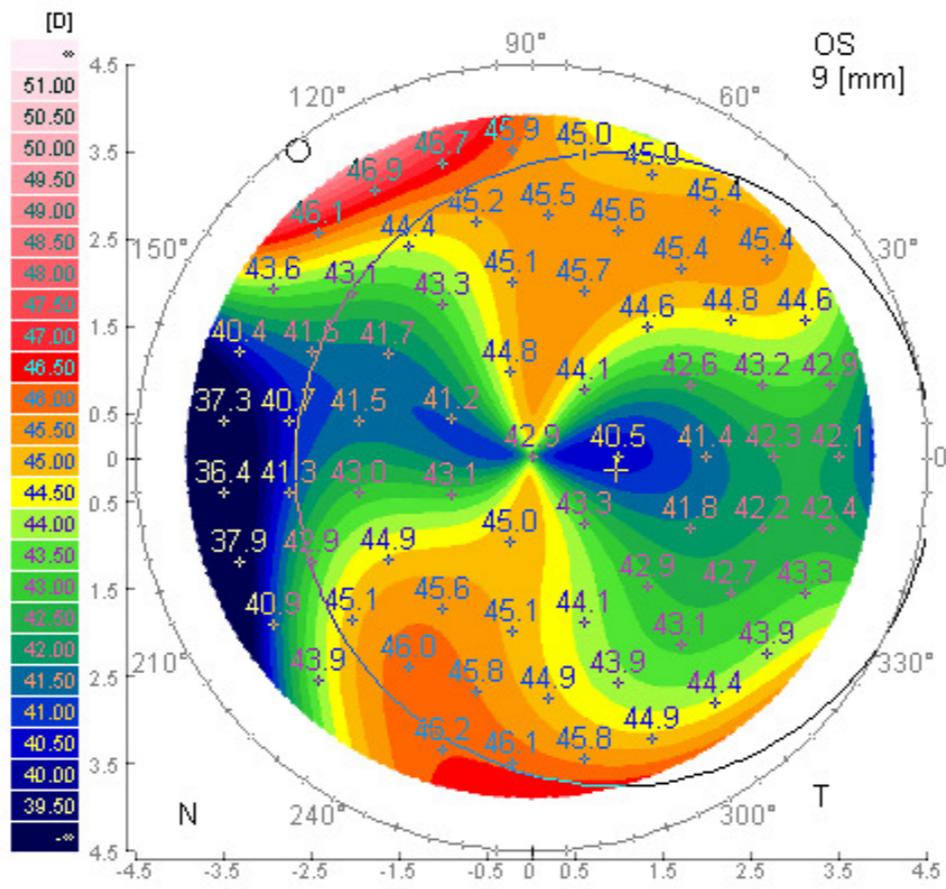
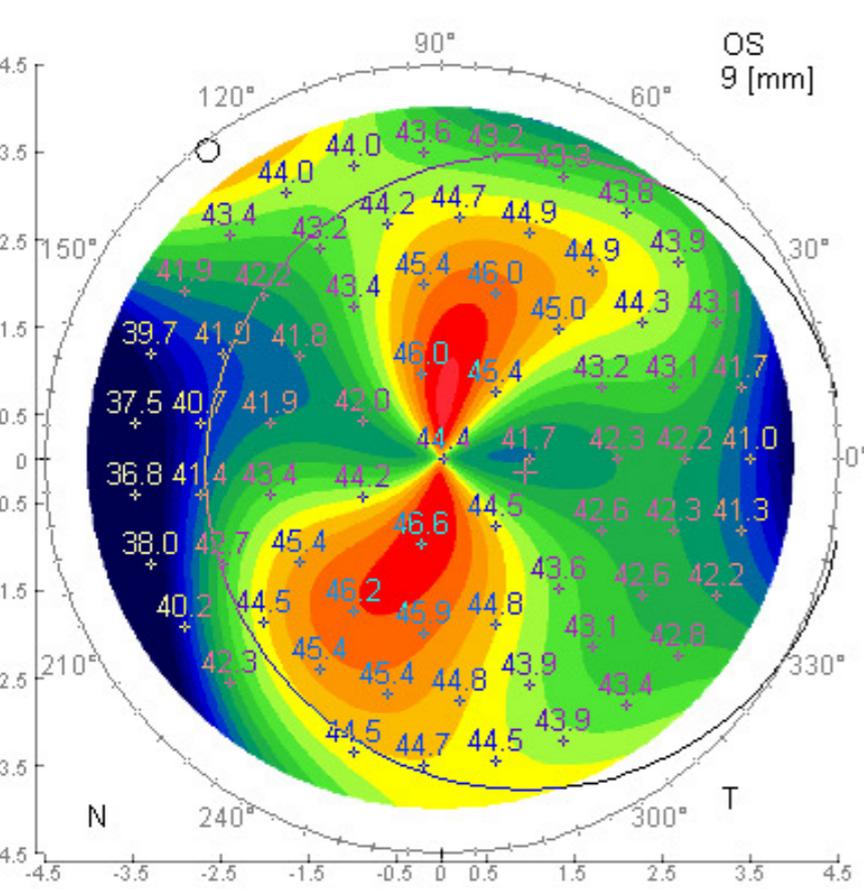


o.sin. - 46.0-46.2 / 41.9-42.3

Axial Curvature
 n=1.3375 ROIØ=8.0 [mm] Quality? ?

Total Corneal Power (Ray Traced)
 ROIØ=7.8 [mm] Quality? ?

SimK Values
 n=1.3375 ROIØ=1-4[mm]



SimKavg 44.30 [D] (7.62 [mm])
 SimKf 42.06 [D] (8.02 [mm])
 SimKs 46.54 [D] (7.25 [mm])
 Astigmatism 4.48 [D] @80.0 [°]

Anterior Instantaneous Curvature
 n=1.3375 ROIØ=1-4[mm]

Kavg 43.99 [D] (7.67 [mm])
 Kf 41.96 [D] (8.04 [mm])
 Ks 46.02 [D] (7.33 [mm])
 Astigmatism 4.06 [D] @68.0 [°]
 ε² 0.81

Total Corneal Power (Ray Traced)
 ROIØ=1-4[mm]

Mean 43.20 [D]
 Flat 41.11 [D]
 Steep 45.29 [D]
 Astigmatism 4.19 [D] @81.0 [°]

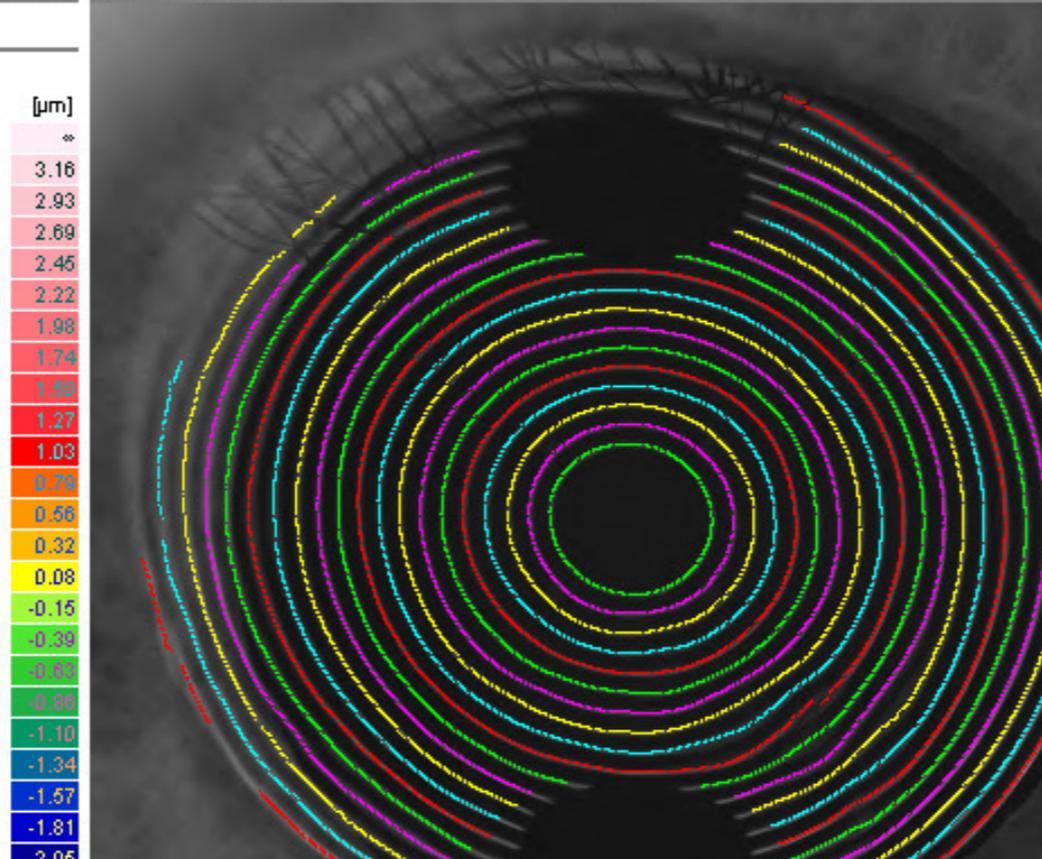
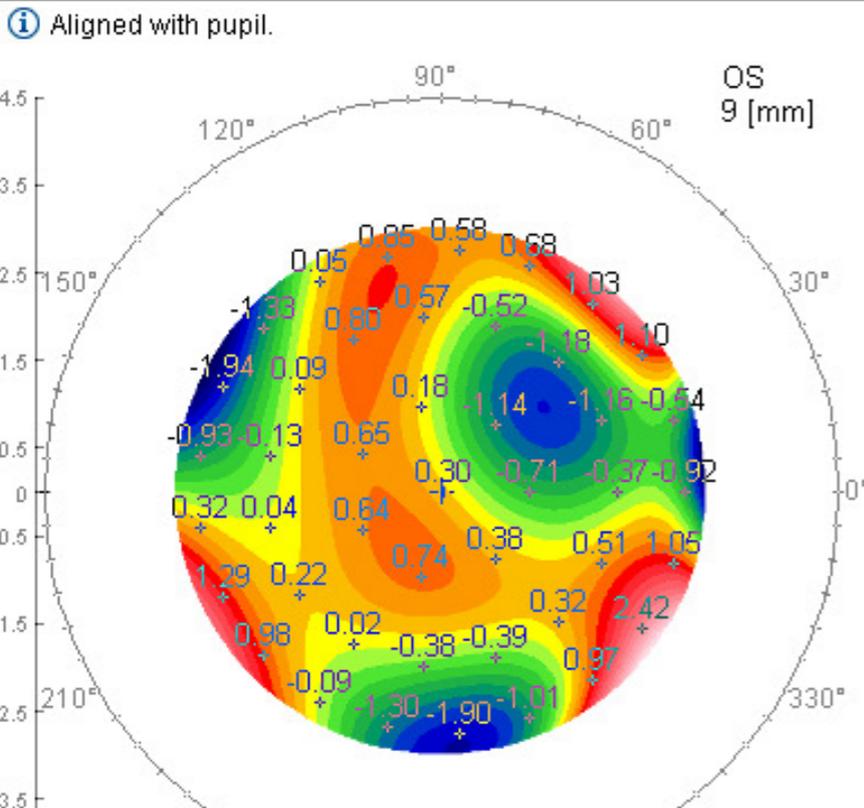
Central Avg. 43.12 [D] ROIØ=0-4[mm]
 Paracentral Avg. 43.70 [D] ROIØ=4-7[mm]
 Peripheral Avg. 43.52 [D] ROIØ=7-10[mm]

Total Corneal Wavefront
 n=1.376 ROIØ=6[mm]

Total Corneal Wavefront HOA
 ROIØ=6.0 [mm] RMS=0.85 [µm] Quality? ?

Placido Image

RMS HOA 0.85 [µm]
 Spherical Aberration 0.10 [µm]



Chamber (Ray Traced)

Avg. Anterior Segment Length...
 ...from Endothelium 5.37 [mm]
 Avg. Anterior Chamber Depth...
 ...from Endothelium 2.91 [mm]
 Volume (Ø8mm) n/a

Avg. An... n/a
 N 44.8 [°] 33.3 [°] T
 n/a

Limbus

Nasal-Temporal 11.97 [mm]
 Superior-Inferior 11.68 [mm]

Pupil

Avg. Diameter 7.25 [mm]
 Center x, y 0.95 [mm], -0.15 [mm]

- ▶ Pre-op. visus o.dx. 0,25 (-13,25 cyl -4,25 ax 29)
o.sin. 0,32 (-9,0 cyl -4,75 cyl 167)

corneal plane

- ▶ IOL Zeiss AT Torbi 709M
oikea +10,0 cyl +3,0 @ 119
vasen +10,5 cyl +5,0 ax 79

IOL plane

- ▶ 10 min. post-op. AR oikea +1,0 cyl -3,0 ax 56 = 0,1
vasen +0,75 cyl -2,25 ax 94 = 0,25

- ▶ 1 vko post-op. AR oikea -0,5 cyl -1,75 ax 40 = 0,630s
vasen +0,5 cyl -2,0 ax 96 = 1,00s
skia + subj.: oikea -0,75 cyl -1,25 ax 40 = 0,5
vasen il = 0,6

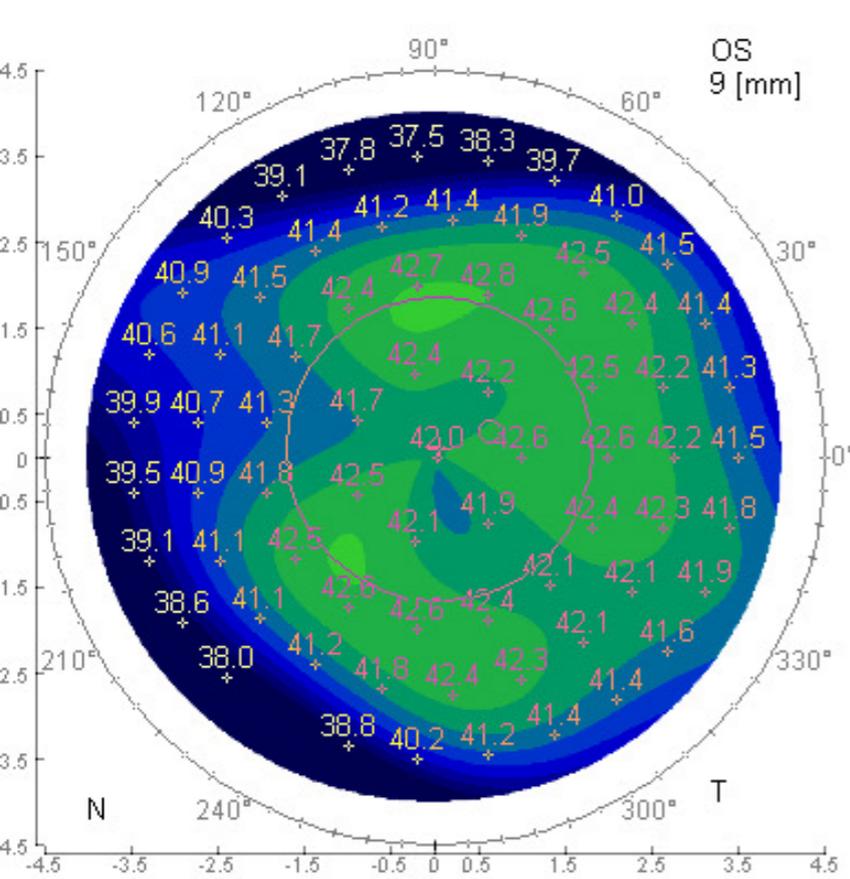
kuvan laatu subj. parempi il vaikka visus alempi?

Tapaus 6:
KERATOKONUS
Kontraindikaatio!

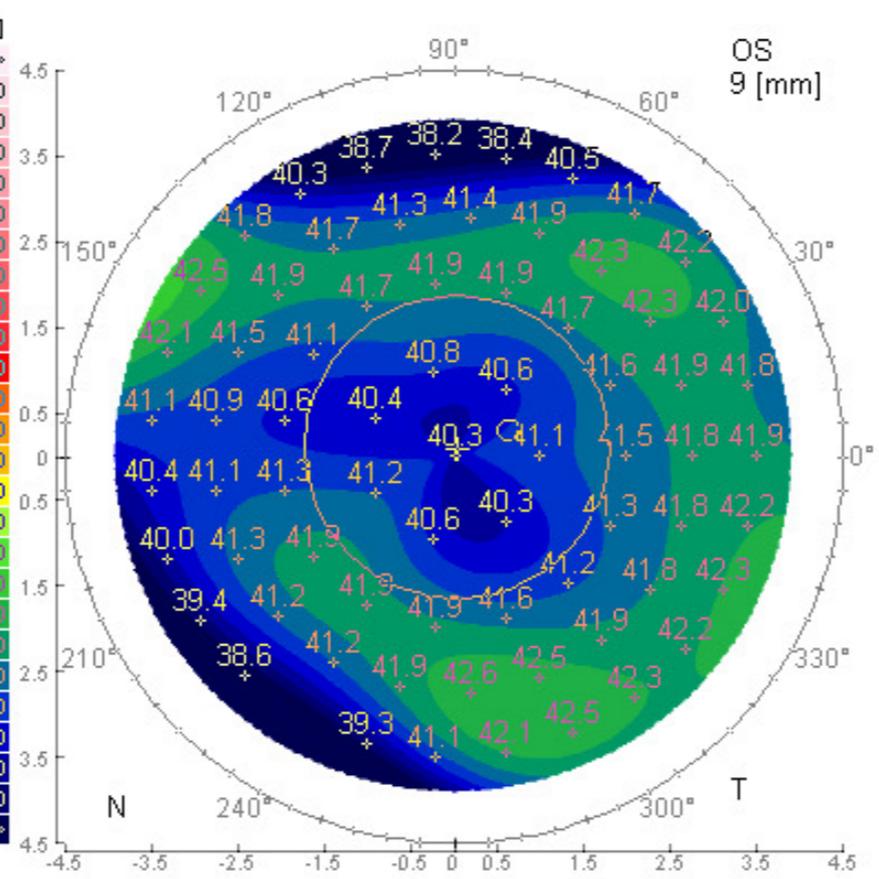
- ▶ 55-vuotias mies. Lähetete phaco + IOL o.dx. Jo lukioaikana oikean visus alkanut heikentyä. Lähetetevisus kädenliike 1 m / 0,6os il, lep. Kutsuttu suoraan leikkaukseen, esitutkimus leikkauspäivänä.
- ▶ IOL-Master:
 - oikea AL 23,78mm, R ei onnistu
 - vasen AL 23,93mm, R 8,03@169, 7,94@79, cyl -0,48@169
 - Nidek AR: oikea R 8,06@53, 6,99@142, cyl -6,5@53
- ▶ Leikkauspäivänä todetaan korkea hajataitteisuus, potilas tuodaan minulle toorisen IOL:n valintaa ja tilausta varten... Galilei otettu...
Oikea: Visus 0,63os (-0,5 cyl -7,75 ax 52). Reilu tumaskleroosi.
Vasen: Visus 1,0 (+1,25 cyl -1,0 ax 102). Alkava tumaskleroosi.

o.sin. - IOL Power (parempi silmä, ok)

Axial Curvature
 n=1.3375 ROIØ=8.0 [mm] Quality? ?



Total Corneal Power (Ray Traced)
 ROIØ=7.8 [mm] Quality? ?



SimK Values
 n=1.3375 ROIØ=1-4[mm]

SimKavg 42.23 [D] (7.99 [mm])
 SimKf 42.00 [D] (8.04 [mm])
 SimKs 42.46 [D] (7.95 [mm])
 Astigmatism 0.46 [D] @53.0 [°]
 Anterior Instantaneous Curvature
 n=1.3375 ROIØ=1-4[mm]

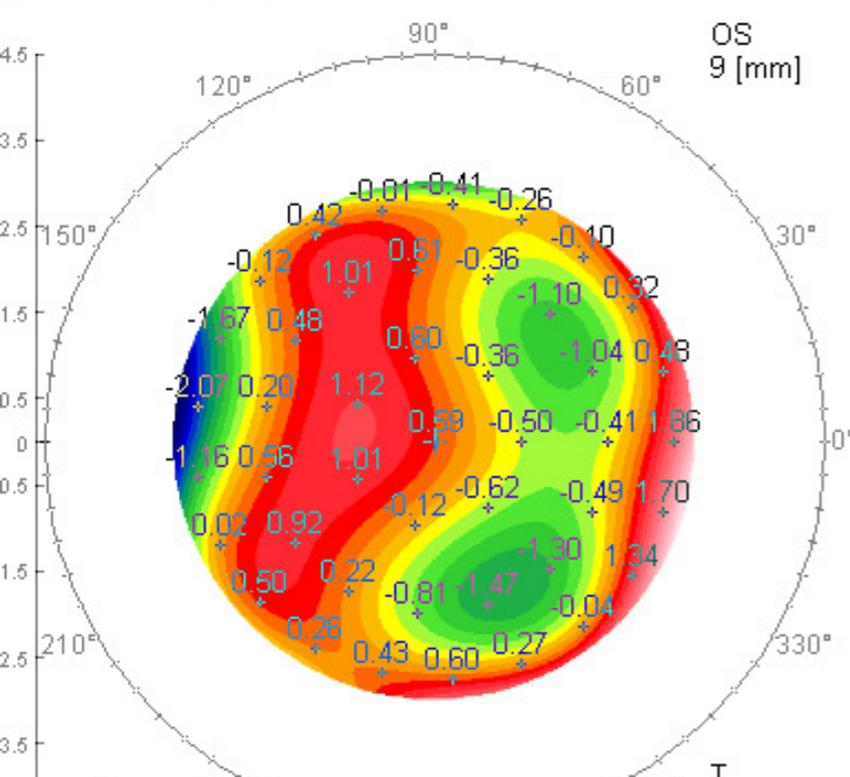
Kavg 42.38 [D] (7.96 [mm])
 Kf 41.80 [D] (8.07 [mm])
 Ks 42.96 [D] (7.86 [mm])
 Astigmatism 1.15 [D] @79.0 [°]
 ε² 0.85
 Total Corneal Power (Ray Traced)
 ROIØ=1-4[mm]

Total Corneal Wavefront

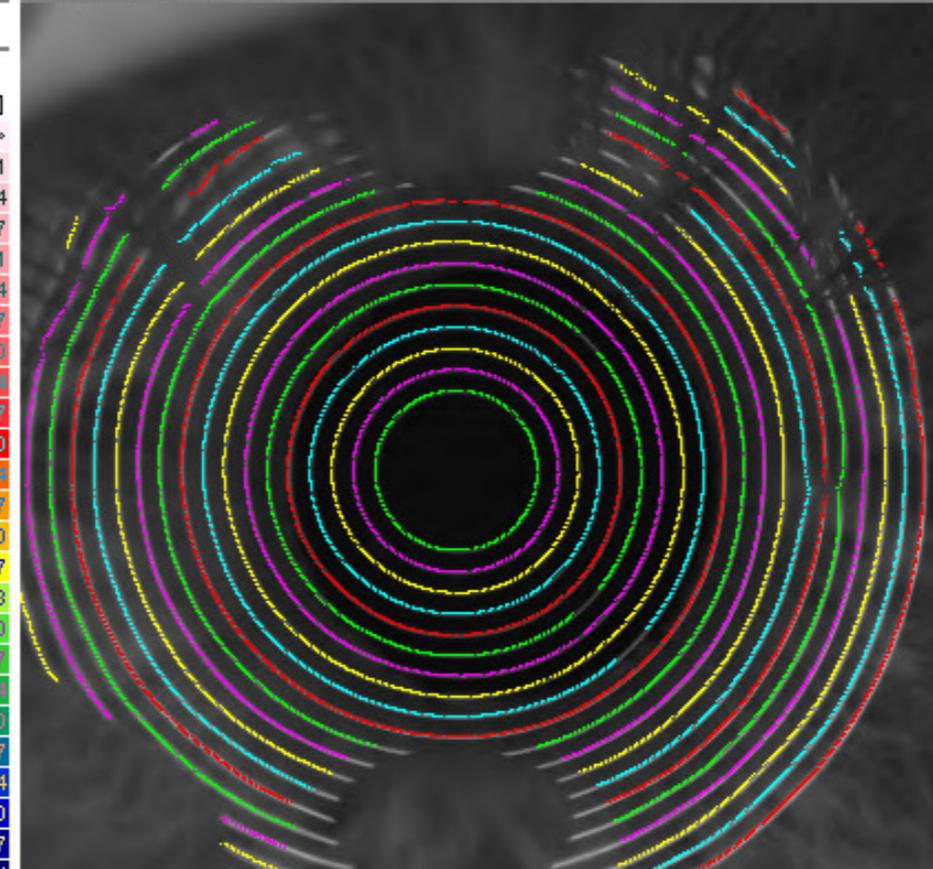
n=1.376 ROIØ=6[mm]
 RMS HOA 0.87 [µm]
 Spherical Aberration 0.17 [µm]
 Chamber (Ray Traced)
 Avg. Anterior Segment Length...
 ...from Endothelium n/a
 Avg. Anterior Chamber Depth...
 ...from Endothelium 2.36 [mm]
 Volume (Ø8mm) 95.1 [mm³]
 Avg. An... 30.5 [°]
 N 29.9 [°] 25.8 [°] T
 26.3 [°]

Total Corneal Wavefront HOA
 ROIØ=6.0 [mm] RMS=0.87 [µm] Quality? ?

Aligned with pupil.



Placido Image



Limbus
 Nasal-Temporal n/a
 Superior-Inferior n/a

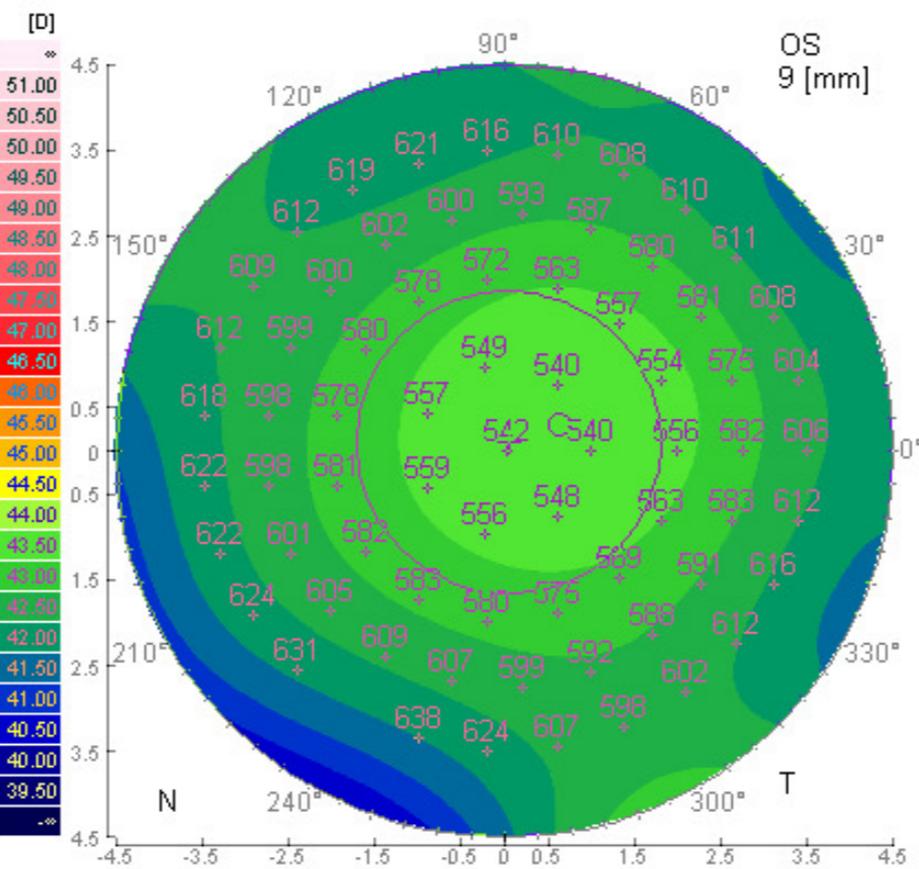
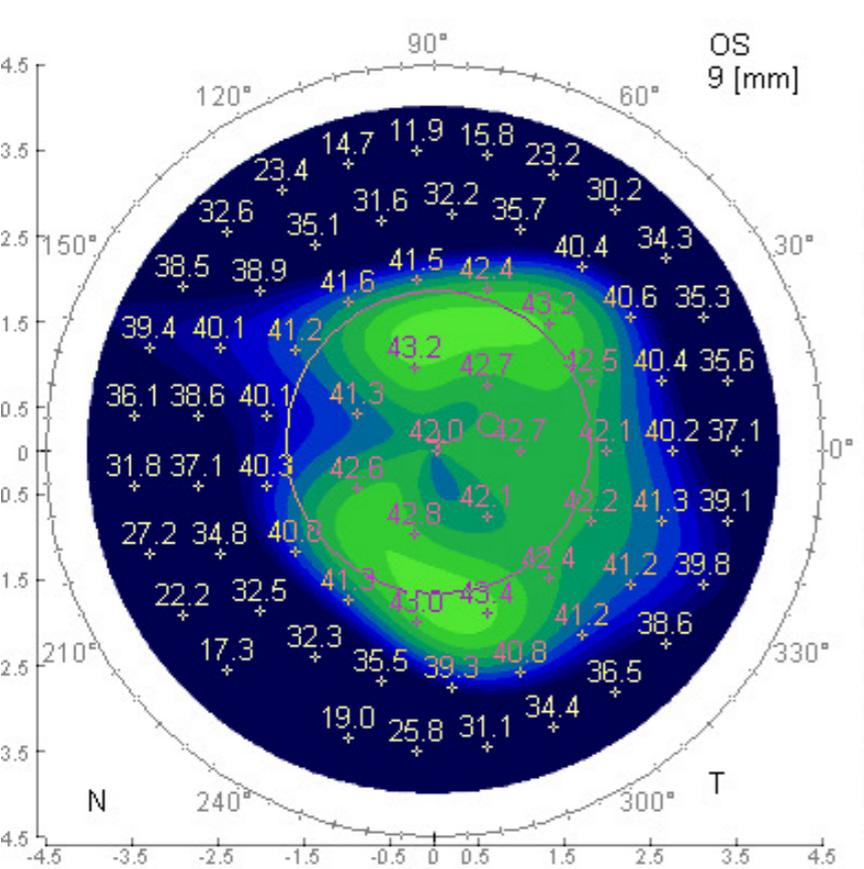
Pupil
 Avg. Diameter 3.52 [mm]
 Center x, y 0.04 [mm], 0.10 [mm]

o.sin. - Keratoconus (parempi silmä, ei keratokonusta)

Anterior Instantaneous Curvature
 n=1.3375 ROIØ=8.0 [mm] Quality?

Corneal Pachymetry
 ROIØ=9.8 [mm]

SimK Values
 n=1.3375 ROIØ=1-4[mm]

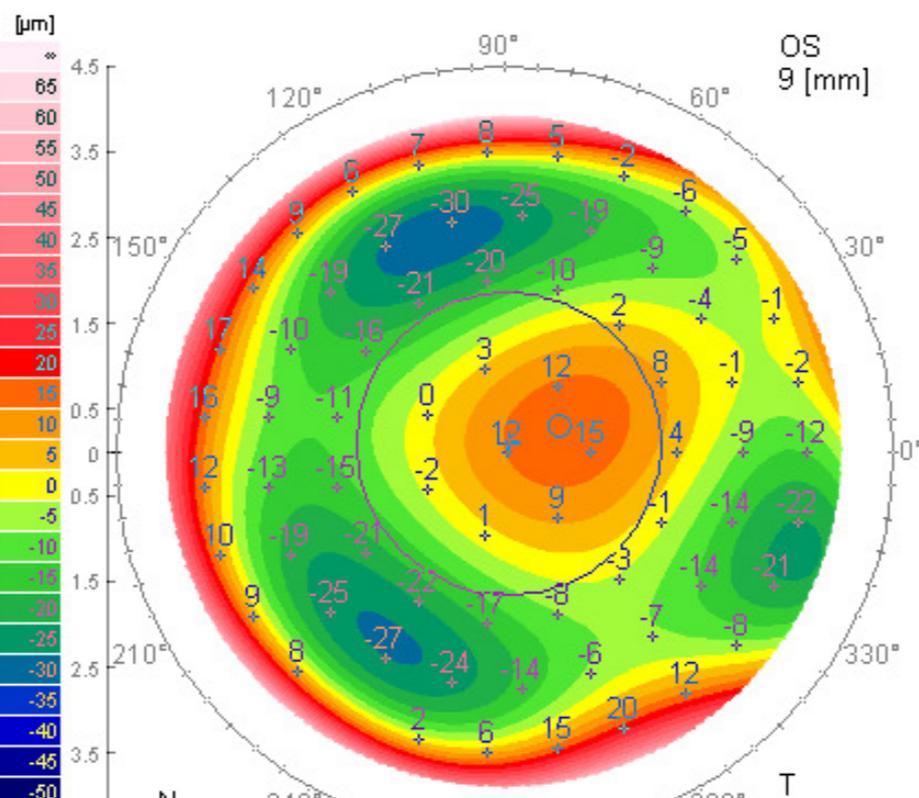
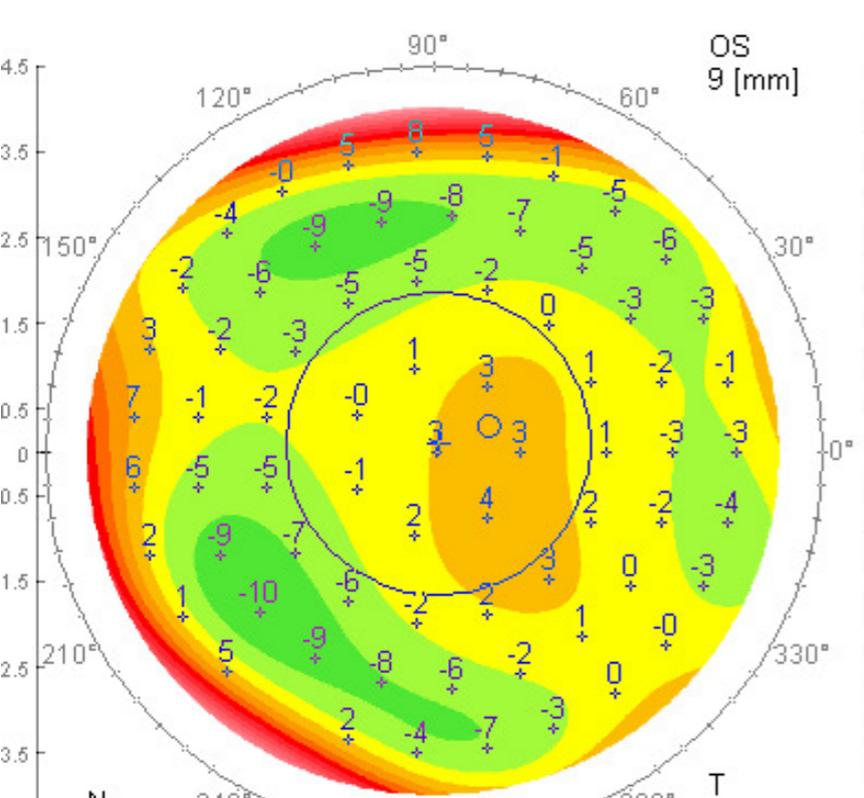


| | | |
|---|--------------------|-------------|
| SimKavg | 42.23 [D] | (7.99 [mm]) |
| SimKf | 42.00 [D] | (8.04 [mm]) |
| SimKs | 42.46 [D] | (7.95 [mm]) |
| Astigmatism | 0.46 [D] | @53.0 [°] |
| Anterior Instantaneous Curvature | | |
| n=1.3375 ROIØ=1-4[mm] | | |
| Kavg | 42.38 [D] | (7.96 [mm]) |
| Kf | 41.80 [D] | (8.07 [mm]) |
| Ks | 42.96 [D] | (7.86 [mm]) |
| Astigmatism | 1.15 [D] | @79.0 [°] |
| ϵ^2 | 0.85 | |
| Posterior Axial Curvature | | |
| n=1.376 ROIØ=1-4[mm] | | |
| Kavg | -6.27 [D] | (6.38 [mm]) |
| Kf | -6.16 [D] | (6.50 [mm]) |
| Ks | -6.39 [D] | (6.26 [mm]) |
| Astigmatism | -0.23 [D] | @93.0 [°] |
| ϵ^2 | 2.49 | |
| Total Corneal Power (Ray Traced) | | |
| ROIØ=1-4[mm] | | |
| Mean | 40.91 [D] | |
| Flat | 40.63 [D] | |
| Steep | 41.19 [D] | |
| Astigmatism | 0.56 [D] @41.0 [°] | |

Anterior Elevation BFS
 ROIØ=8.0 [mm] BFS radius=8.02 [mm] Quality?

Posterior Elevation BFS
 ROIØ=7.8 [mm] BFS radius=6.88 [mm] Quality?

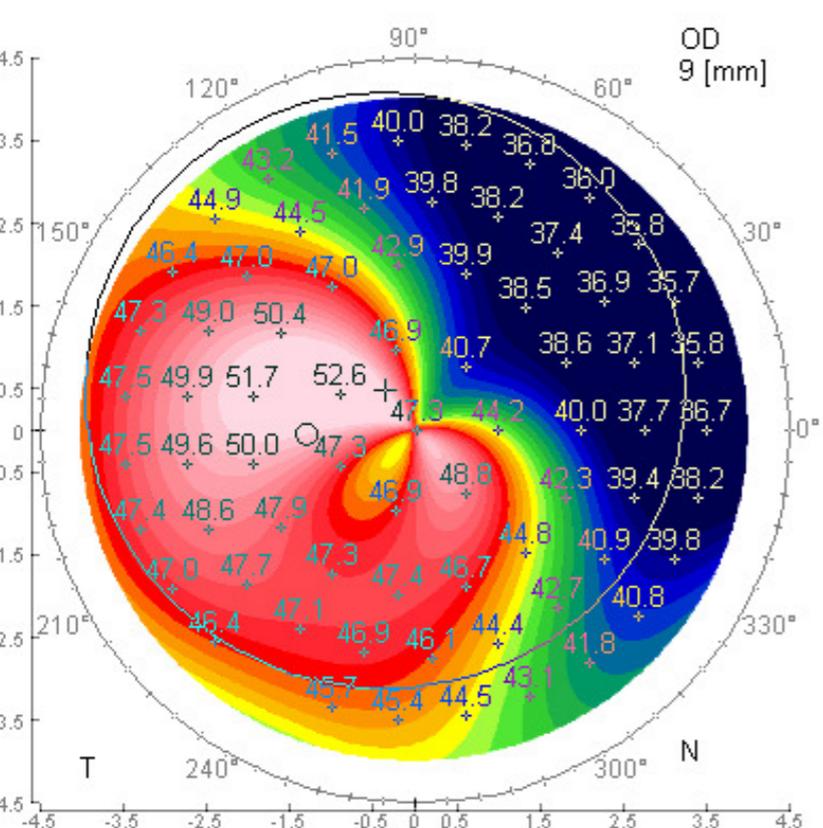
Corneal Pachymetry



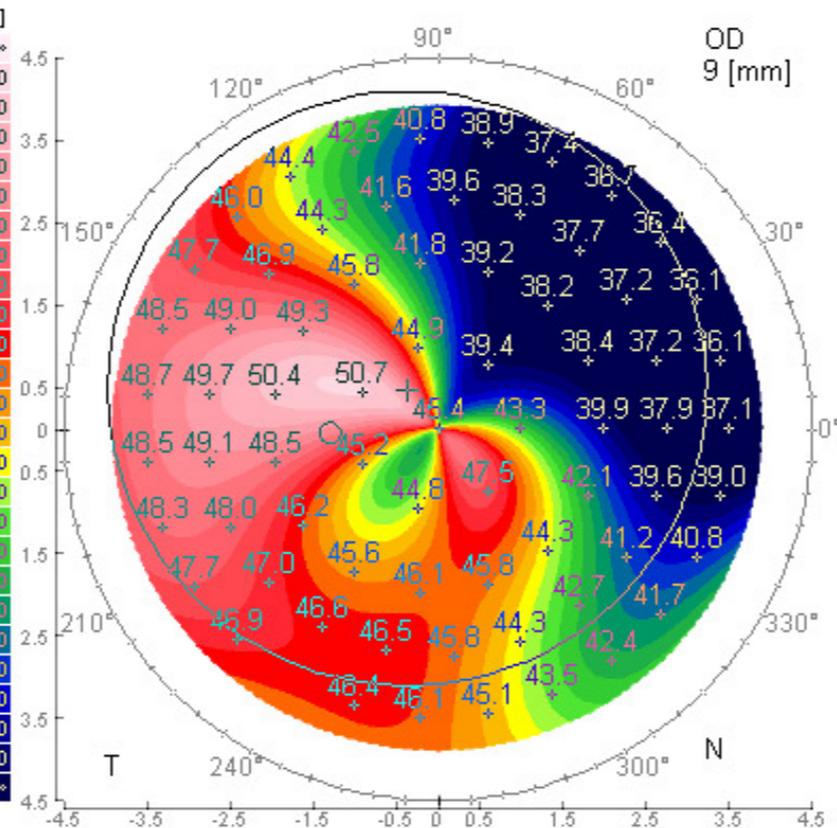
| | | |
|----------------------------|----------------------|---------------|
| Central Avg. | 551 [µm] | ROIØ=0-4[mm] |
| Paracentral Avg. | 592 [µm] | ROIØ=4-7[mm] |
| Peripheral Avg. | 630 [µm] | ROIØ=7-10[mm] |
| Thinnest Pachymetry | | |
| Location x, y | 0.63 [mm], 0.31 [mm] | |
| Thickness | 538 [µm] | |
| Pupil | | |
| Avg. Diameter | 3.52 [mm] | |
| Center x, y | 0.04 [mm], 0.10 [mm] | |
| Keratoconus Indices | | |
| I-S | 1.31 [D] | DSI 1.67 [D] |
| SAI | 0.92 [D] | OSI 1.23 [D] |
| SRI | 1.69 [D] | CSI 0.17 [D] |
| IAI | 0.90 [D] | ACP 42.68 [D] |
| AA | 97.6% | SDP 1.33 [D] |
| KPI | 0.0% | KProb 1.5% |

o.dx. - IOL Power (punaista ja sinistä...?) 38-46 / 44.3-45.8

Axial Curvature
n=1.3375 ROIØ=8.0 [mm]



Total Corneal Power (Ray Traced)
ROIØ=7.8 [mm]



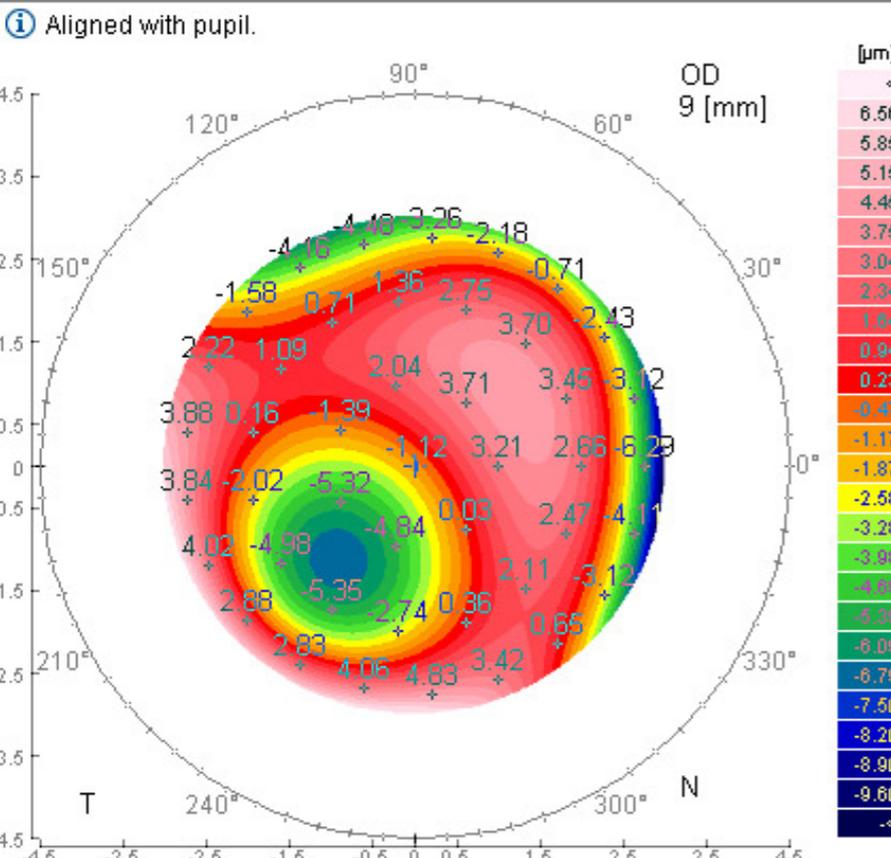
SimK Values
n=1.3375 ROIØ=1-4[mm]

| | | |
|-------------|-----------|-------------|
| SimKavg | 46.31 [D] | (7.29 [mm]) |
| SimKf | 43.09 [D] | (7.83 [mm]) |
| SimKs | 49.53 [D] | (6.81 [mm]) |
| Astigmatism | 6.44 [D] | @141.0 [°] |

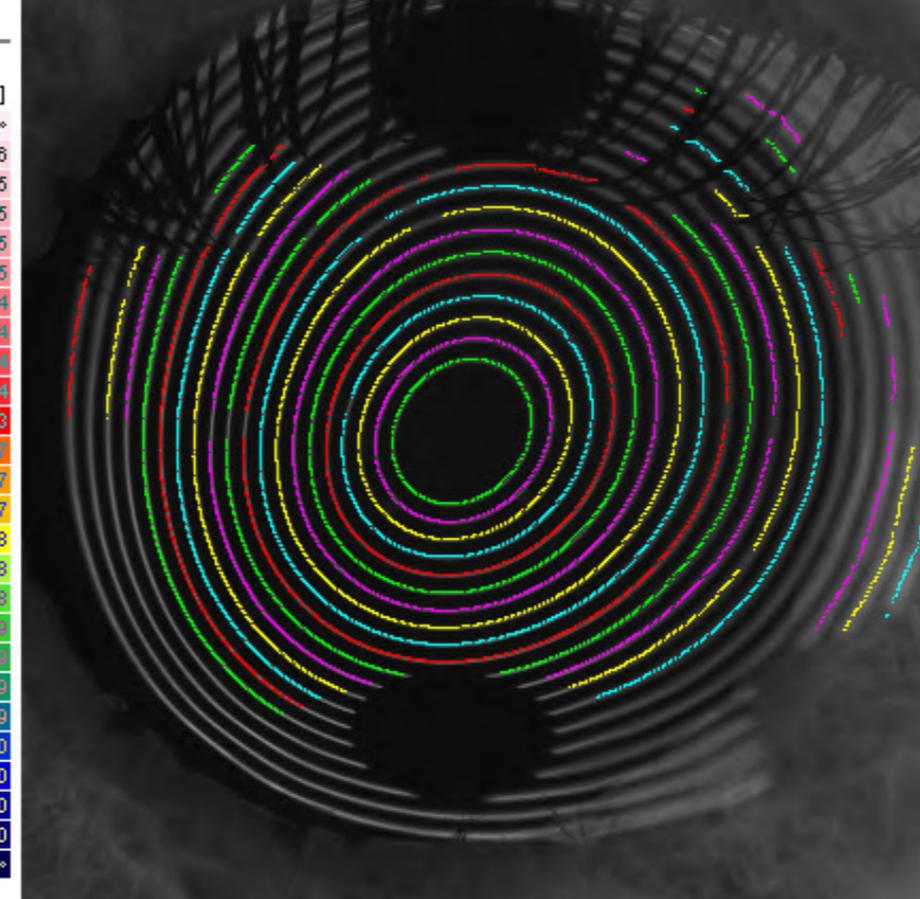
Anterior Instantaneous Curvature
n=1.3375 ROIØ=1-4[mm]

| | | |
|--------------|-----------|-------------|
| Kavg | 44.48 [D] | (7.59 [mm]) |
| Kf | 42.91 [D] | (7.87 [mm]) |
| Ks | 46.06 [D] | (7.33 [mm]) |
| Astigmatism | 3.15 [D] | @145.0 [°] |
| ϵ^2 | 1.39 | |

Total Corneal Wavefront HOA
ROIØ=6.0 [mm] RMS=3.23 [µm]



Placido Image



Total Corneal Power (Ray Traced)
ROIØ=1-4[mm]

| | |
|------------------|-------------------------|
| Mean | 44.83 [D] |
| Flat | 41.50 [D] |
| Steep | 48.17 [D] |
| Astigmatism | 6.67 [D] @143.0 [°] |
| Central Avg. | 44.97 [D] ROIØ=0-4[mm] |
| Paracentral Avg. | 43.44 [D] ROIØ=4-7[mm] |
| Peripheral Avg. | 42.99 [D] ROIØ=7-10[mm] |

Total Corneal Wavefront
n=1.376 ROIØ=6[mm]

| | |
|----------------------|------------|
| RMS HOA | 3.23 [µm] |
| Spherical Aberration | -0.40 [µm] |

Chamber (Ray Traced)

| | |
|--|---------------------|
| Avg. Anterior Segment Length... ...from Endothelium | n/a |
| Avg. Anterior Chamber Depth... ...from Endothelium | 2.53 [mm] |
| Volume (Ø8mm) | 109.6 [mm³] |
| Avg. An... | n/a |
| T | 44.0 [°] 17.8 [°] N |
| | n/a |

Limbus

| | |
|-------------------|------------|
| Nasal-Temporal | 12.08 [mm] |
| Superior-Inferior | 11.81 [mm] |

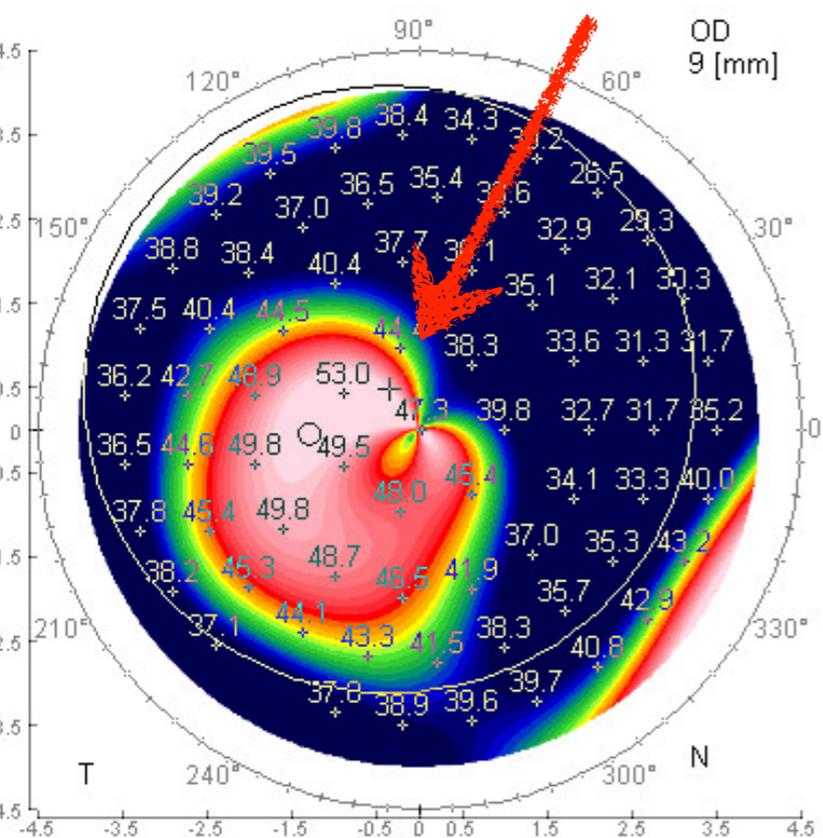
Pupil

| | |
|---------------|-----------------------|
| Avg. Diameter | 7.20 [mm] |
| Center x, y | -0.37 [mm], 0.48 [mm] |

o.dx. - Keratoconus

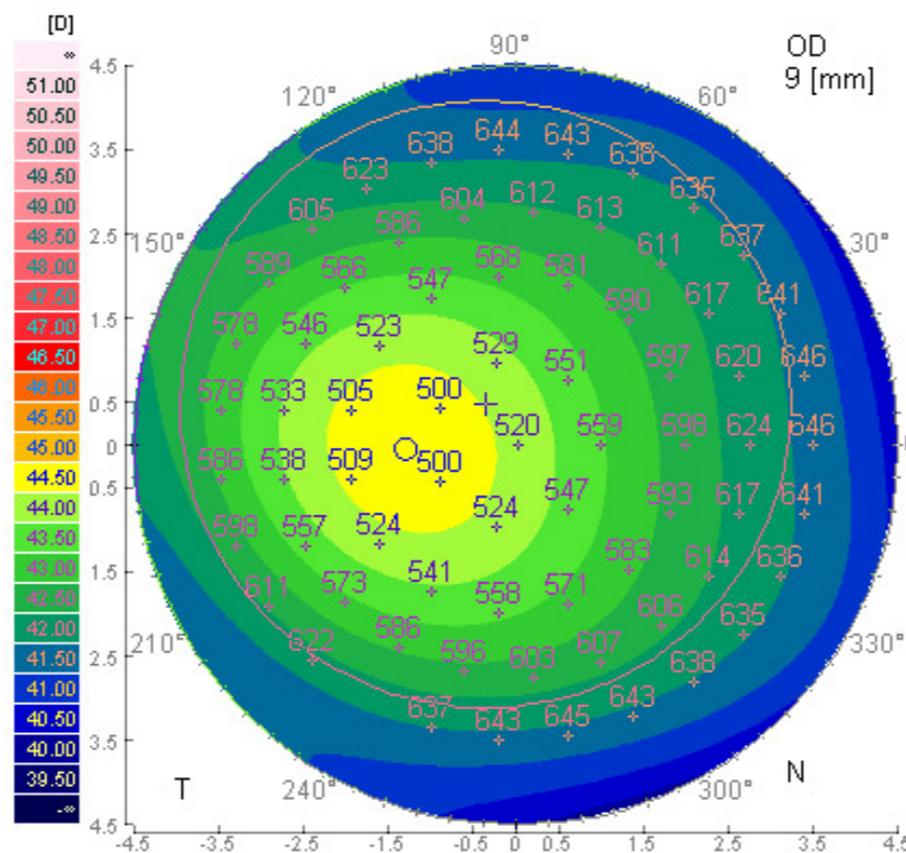
Anterior Instantaneous Curvature

n=1.3375 ROIØ=8.0 [mm]



Corneal Pachymetry

ROIØ=9.8 [mm]



SimK Values

n=1.3375 ROIØ=1-4[mm]

| | | |
|-------------|-----------|-------------|
| SimKavg | 46.31 [D] | (7.29 [mm]) |
| SimKf | 43.09 [D] | (7.83 [mm]) |
| SimKs | 49.53 [D] | (6.81 [mm]) |
| Astigmatism | 6.44 [D] | @141.0 [°] |

Anterior Instantaneous Curvature

n=1.3375 ROIØ=1-4[mm]

| | | |
|--------------|-----------|-------------|
| Kavg | 44.48 [D] | (7.59 [mm]) |
| Kf | 42.91 [D] | (7.87 [mm]) |
| Ks | 46.06 [D] | (7.33 [mm]) |
| Astigmatism | 3.15 [D] | @145.0 [°] |
| ϵ^2 | 1.39 | |

Posterior Axial Curvature

n=1.376 ROIØ=1-4[mm]

| | | |
|--------------|-----------|-------------|
| Kavg | -6.99 [D] | (5.72 [mm]) |
| Kf | -6.59 [D] | (6.07 [mm]) |
| Ks | -7.39 [D] | (5.41 [mm]) |
| Astigmatism | -0.80 [D] | @126.0 [°] |
| ϵ^2 | 1.79 | |

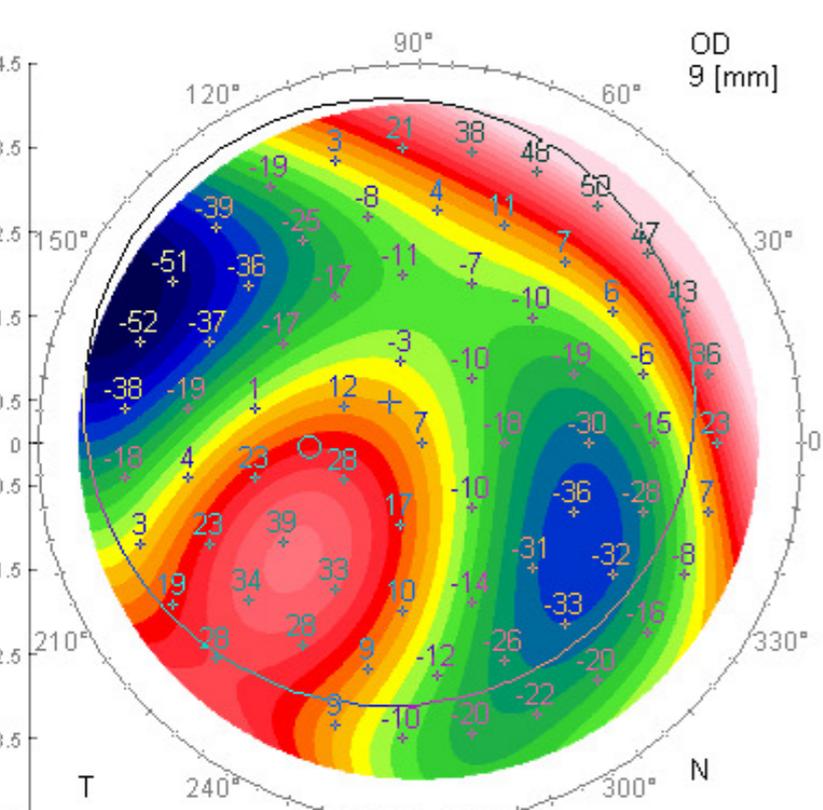
Total Corneal Power (Ray Traced)

ROIØ=1-4[mm]

| | |
|-------------|---------------------|
| Mean | 44.83 [D] |
| Flat | 41.50 [D] |
| Steep | 48.17 [D] |
| Astigmatism | 6.67 [D] @143.0 [°] |

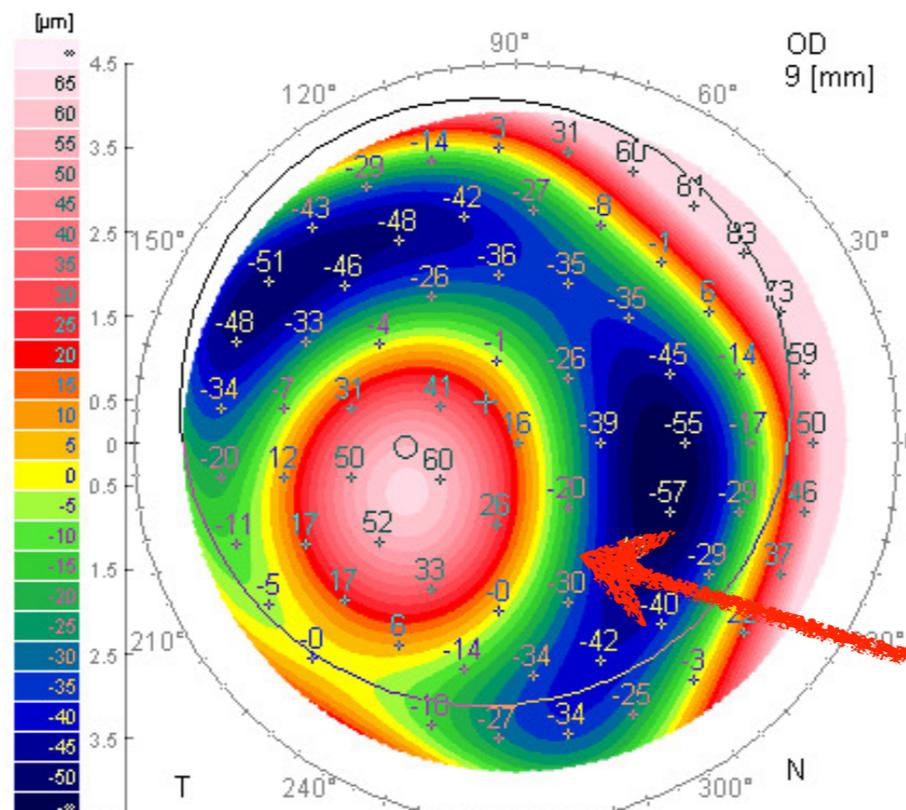
Anterior Elevation BFS

ROIØ=8.0 [mm] BFS radius=7.57 [mm]



Posterior Elevation BFS

ROIØ=7.8 [mm] BFS radius=6.28 [mm]



Corneal Pachymetry

| | | |
|------------------|----------|---------------|
| Central Avg. | 532 [µm] | ROIØ=0-4[mm] |
| Paracentral Avg. | 589 [µm] | ROIØ=4-7[mm] |
| Peripheral Avg. | 658 [µm] | ROIØ=7-10[mm] |

Thinnest Pachymetry

| | |
|---------------|------------------------|
| Location x, y | -1.30 [mm], -0.05 [mm] |
| Thickness | 495 [µm] |

Pupil

| | |
|---------------|-----------------------|
| Avg. Diameter | 7.20 [mm] |
| Center x, y | -0.37 [mm], 0.48 [mm] |

Keratoconus Indices

| | | | |
|-----|----------|-------|-----------|
| I-S | 6.21 [D] | DSI | 12.17 [D] |
| SAI | 6.25 [D] | OSI | 9.61 [D] |
| SRI | 1.99 [D] | CSI | 2.38 [D] |
| IAI | 0.90 [D] | ACP | 47.53 [D] |
| AA | 97.6% | SDP | 4.49 [D] |
| KPI | 100.0% | KProb | 100.0% |

- ▶ Todetaan keratokonus. Leikkaus perutaan toistaiseksi. Ei indikaatiota tooriselle tekomykiölle. Ohjataan potilas optikolle.
- ▶ Lasit 2010 (monitehot):
oikea +1,0 sph, vasen +2,0 cyl -0,75 ax 97, add +2,0
- ▶ Refraktio:
oikea +1,5 cyl -7,5 ax 40 = 0,7
vasen +1,5 cyl -1,25 ax 100 = 1,5
binok. kauas 1,5-, lähivisuus 0,6
- ▶ Potilas toivoi sankalaskorjausta, sai reseptin optikolta. Optikko suositteli kaukolaseja (vanhat monitehot toimivat vielä hyvin lähikäytössä).
- ▶ Leikkaus sitten joskus myöhemmin...? ***Ei toorista linssiä!***

