



Aberrometria in chirurgia della cataratta e in refrattiva

Claudio Carbonara

Catanzaro, 7 ottobre 2016



e
hnologies

Che cosa è ITrace?

Auto refrattometro

Aberrometro ray tracing

Topografo corneale

Autocheratometro

Pupillometro



Aberrometria oculare

Angolo alfa e kappa

W-to-W, centro pupill. e
visivo.

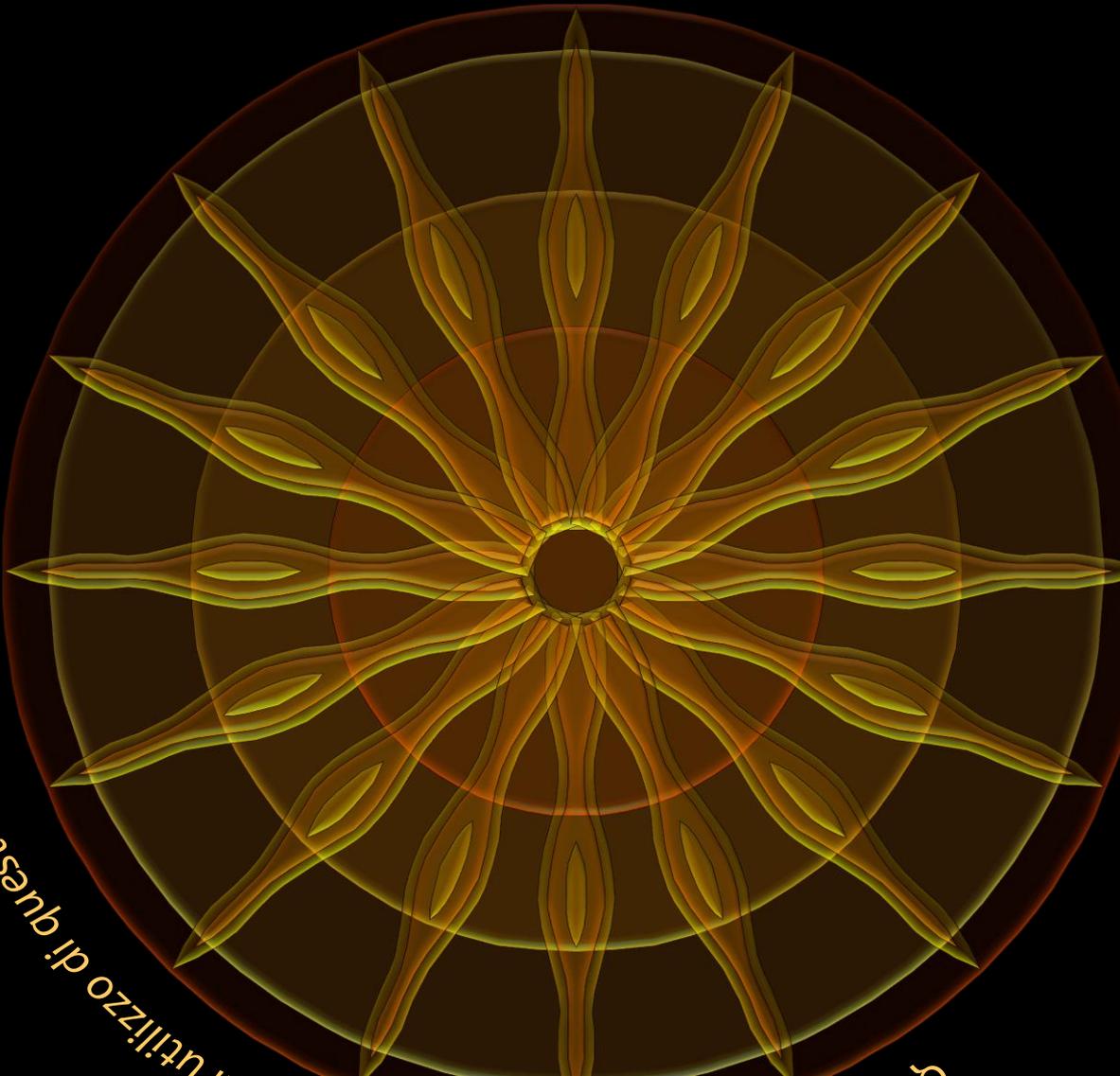
Posizionamento IOL

Misurazione quantitativa
cataratta





utilizzo di questo device:





Chirurgia premium della cataratta



Chirurgia refrattiva laser



Diagnostica avanzata della qualità visiva



Soluzione dei problemi "misteriosi"

Scelta della IOL

Controllare aberrazione sferica

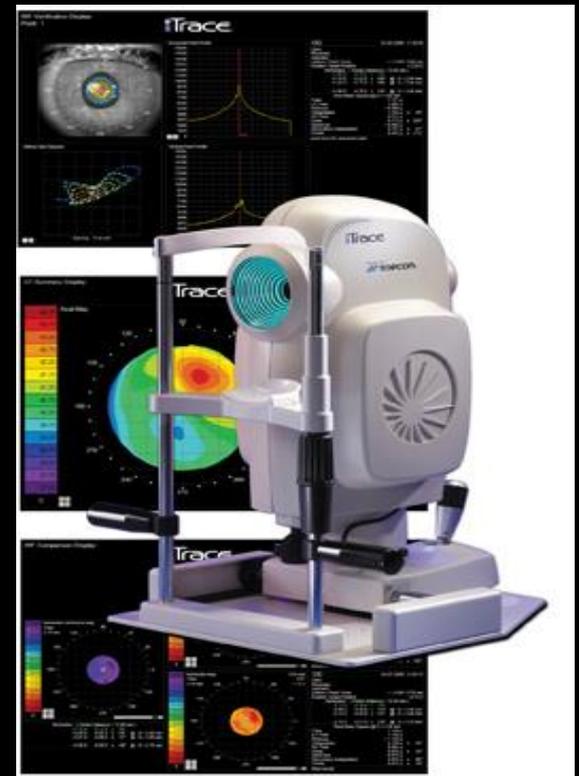
In base al valore misurato scegliere la IOL adatta

Tecnis -0,27micron

Alcon IQ -0,20 micron

Physiol -0,16 micron

B&L 0 micron



Clinic
 Physician
 Operator

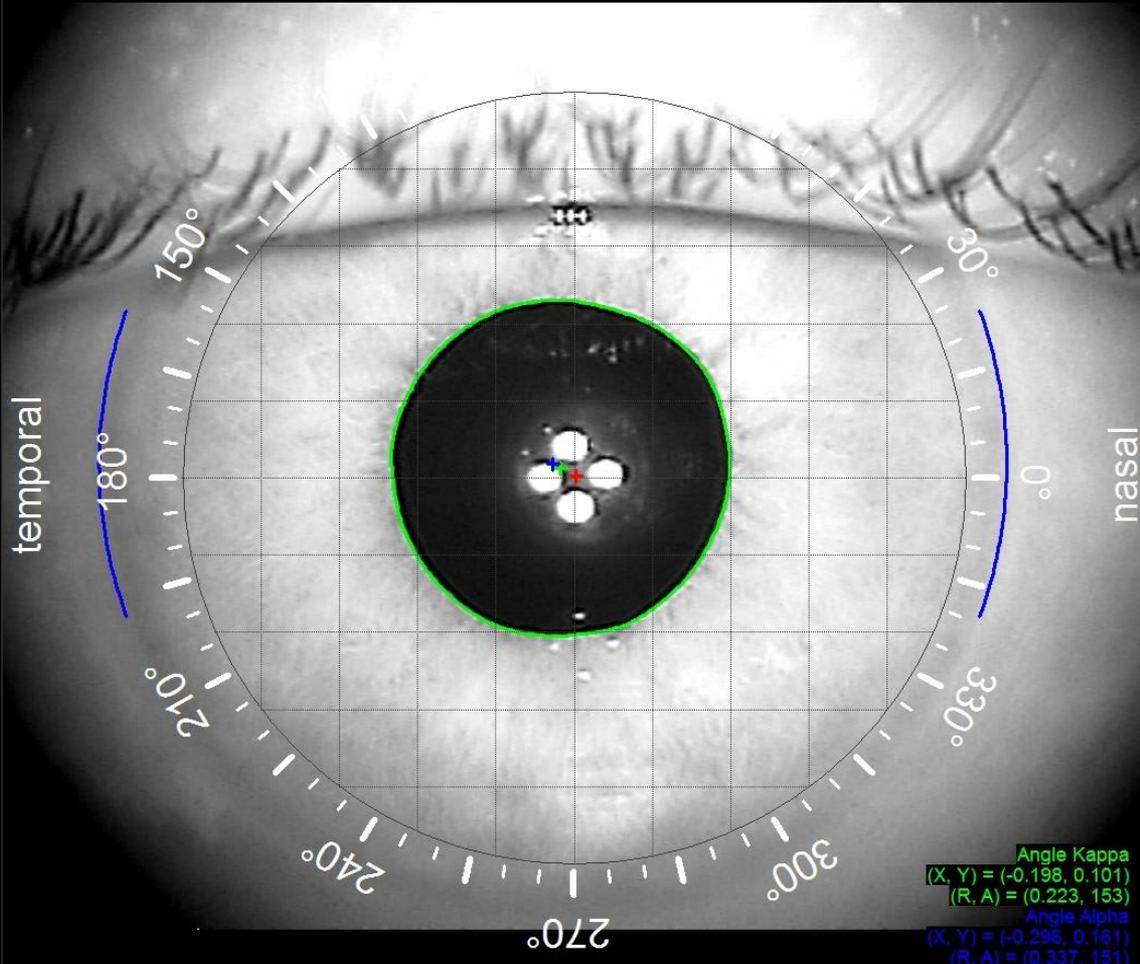
Limbus / Pupil / Scan 11.59 / 4.35 / 3.20 mm
 Fixation Target Position + 7.25 D

Tracey Refraction **-0.37 D -1.37 D x 135°**
 -0.48 D -1.41 D x 134° @ D ≤ 2.00 mm / D = 12.00 mm
 -0.42 D -1.32 D x 136° @ D ≤ 3.00 mm / D = 12.00 mm
@ D ≤ 5.00 mm / D = 12.00 mm
 -0.40 D -1.32 D x 135° @ D ≤ 3.20 mm / D = 12.00 mm

Root Mean Square @ D ≤ 3.20 mm

Total	0.527 μ
LO Total	0.513 μ
Defocus	+ 0.386 μ
Astigmatism	0.337 μ x 45°
<u>HO Total</u>	<u>0.120 μ</u>
Coma	0.019 μ x 0°
Spherical	- 0.013 μ
Secondary Astigmatism	0.004 μ x 172°
Trefoil	0.088 μ x 110°

Aligned on IR dots.
 Angle Kappa Distance: 0.223 mm @ 153°
 Angle Alpha Distance: 0.337 mm @ 151°



Angle Kappa
 (X, Y) = (-0.198, 0.101)
 (R, A) = (0.223, 153)
 Angle Alpha
 (X, Y) = (-0.296, 0.161)
 (R, A) = (0.337, 151)

WF and CT Summary Display



Group: carbonara

INTERNAL - RMS Total. no Defocus 3.30 mm

z	Name	μ	1
3	Astigmatism	0.623	[Red bar]
5	Astigmatism	0.573	[Red bar]
6	Trefoil	0.306	[Red bar]
7	Coma	0.169	[Blue bar]
8	Coma	0.050	[Blue bar]
9	Trefoil	0.388	[Blue bar]
10	Tetrafoil	0.106	[Blue bar]
11	Astigmatism	0.050	[Red bar]
12	Spherical	0.154	[Red bar]
13	Astigmatism	0.141	[Blue bar]
14	Tetrafoil	0.271	[Red bar]

TOTAL EYE - RMS Total. no Defocus 3.30 mm

z	Name	μ	1
3	Astigmatism	0.530	[Red bar]
5	Astigmatism	0.317	[Red bar]
6	Trefoil	0.278	[Red bar]
7	Coma	0.185	[Blue bar]
8	Coma	0.040	[Blue bar]
9	Trefoil	0.333	[Blue bar]
10	Tetrafoil	0.095	[Blue bar]
11	Astigmatism	0.048	[Red bar]
12	Spherical	0.168	[Red bar]
13	Astigmatism	0.124	[Blue bar]
14	Tetrafoil	0.256	[Red bar]

10-11-2015 16:00:54 **OS**

Limbus 11.93 mm / Pupil 4.15 mm / Scan 3.30 mm

Tracey Refraction -17.00 D -3.37 D x 120°

2.00 mm -14.66 D -4.35 D x 104°

3.00 mm -16.62 D -3.38 D x 116°

5.00 mm

3.30 mm -17.01 D -3.33 D x 120°

HO Total @ D <= 3.30 mm 0.618 μ

Coma 0.189 μ x 258°

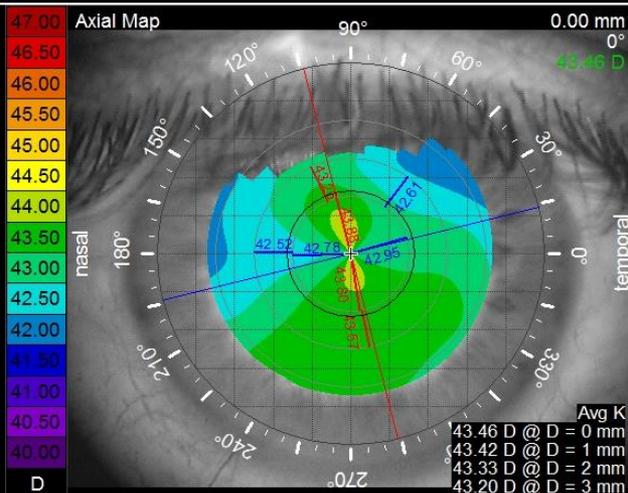
Spherical Aberration + 0.168 μ

Trefoil 0.434 μ x 47°

Angle Alpha D = 0.098 mm @ 21°

CORNEA - RMS Total. no Defocus 3.30 mm

z	Name	μ	1
3	Astigmatism	0.093	[Blue bar]
5	Astigmatism	0.256	[Blue bar]
6	Trefoil	0.028	[Blue bar]
7	Coma	0.016	[Blue bar]
8	Coma	0.009	[Blue bar]
9	Trefoil	0.055	[Red bar]
10	Tetrafoil	0.010	[Red bar]
11	Astigmatism	0.001	[Red bar]
12	Spherical	0.013	[Red bar]
13	Astigmatism	0.017	[Red bar]
14	Tetrafoil	0.015	[Blue bar]



10-11-2015 16:00:59 **OS**

Refractive Power @ D <= 3.00 mm

Steep 44.03 D x 105°

Flat 43.08 D x 6°

Astigmatism 0.95 D x 105°

Effective RP 43.56 D

Central Radius / Power 7.77 mm / 43.46 D

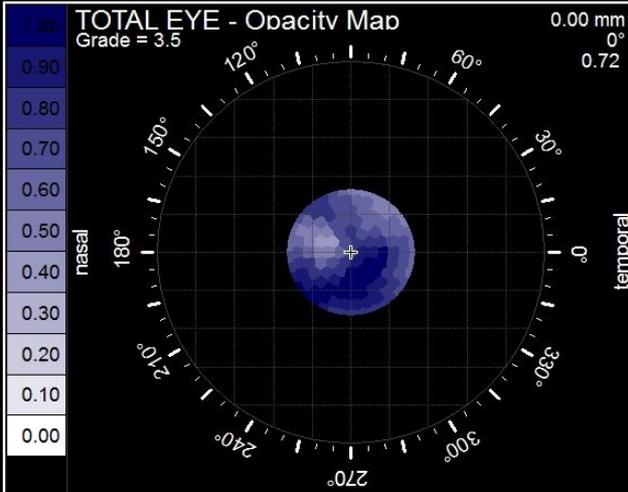
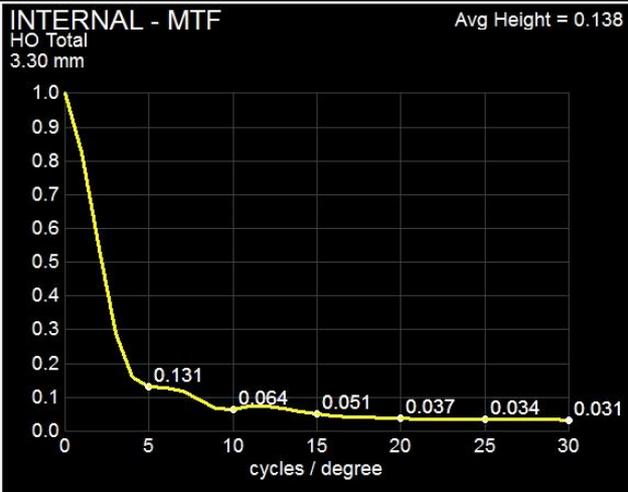
Corneal SphAb @ D = 6.00 mm +0.238 μ

I-S Axial Power @ D = 6.00 mm 0.57 D

Dysfunctional Lens Analysis



Group: carbonara



10-11-2015 16:00:54 **OS**

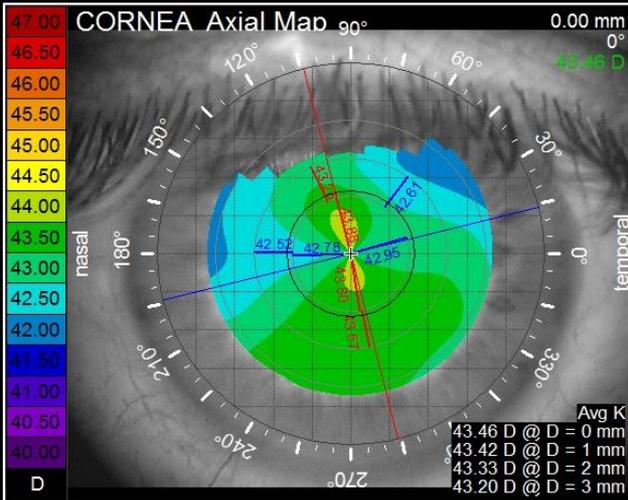
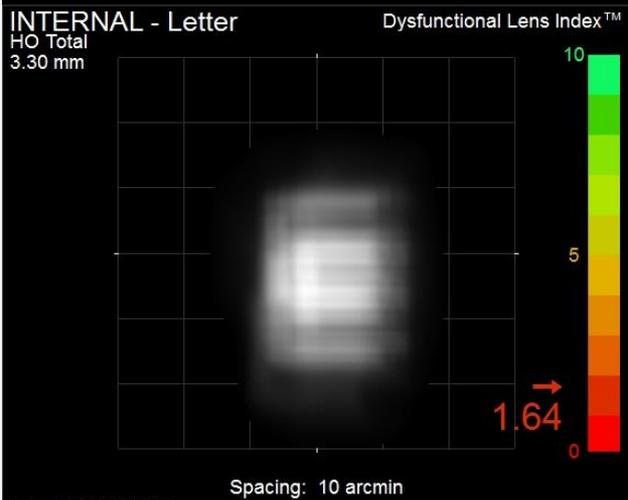
Limbus 11.93 mm / Pupil 4.15 mm / Scan 3.30 mm

Tracey Refraction -17.00 D -3.37 D x 120°

DLI™ @ D ≤ 3.30 mm = 1.64

HO Total @ D ≤ 3.30 mm =
TOTAL EYE 0.618 μ
CORNEA 0.071 μ
INTERNAL 0.667 μ

Angle Alpha D = 0.098 mm @ 21°



10-11-2015 16:00:59 **OS**

Refractive Power @ D ≤ 3.00 mm
Steep 44.03 D x 105°
Flat 43.08 D x 6°
Astigmatism 0.95 D x 105°

Effective RP 43.56 D

Central Radius / Power 7.77 mm / 43.46 D

Corneal SphAb @ D = 6.00 mm +0.238 μ

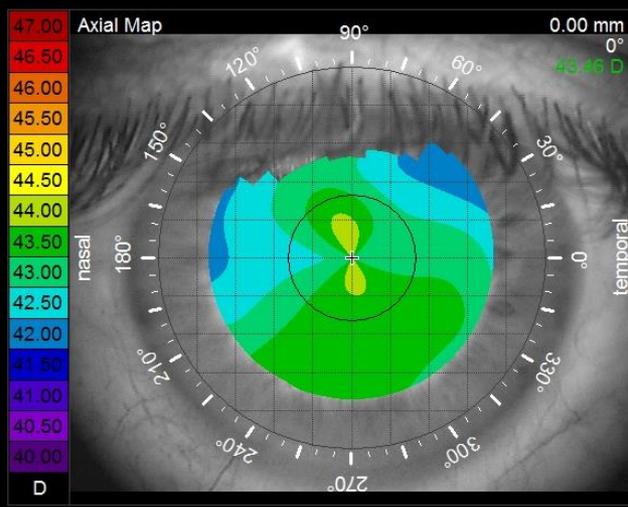
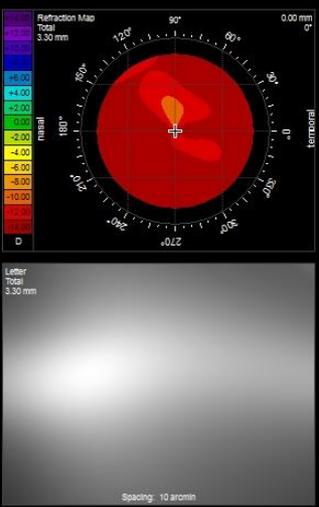
I-S Axial Power @ D = 6.00 mm 0.57 D

IOL Selection Analysis



Group: carbonara

OS



TOTAL EYE - RMS Total 3.30 mm

Z	Name	μ
3	Astigmatism	0.630
5	Astigmatism	0.317
6	Trefoil	0.276
7	Coma	0.185
8	Coma	0.040
9	Trefoil	0.333
10	Tetrafoil	0.095
11	Astigmatism	0.048
12	Spherical	0.168
13	Astigmatism	0.124
14	Tetrafoil	0.230

INTERNAL - RMS Total 3.30 mm

Z	Name	μ
3	Astigmatism	0.623
5	Astigmatism	0.573
6	Trefoil	0.309
7	Coma	0.189
8	Coma	0.050
9	Trefoil	0.388
10	Tetrafoil	0.199
11	Astigmatism	0.050
12	Spherical	0.154
13	Astigmatism	0.141
14	Tetrafoil	0.271

IOL Selection Checklist

Question	Yes	No
Is Tracey Refraction normal?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Are Corneal HOAs present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Are Internal HOAs present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Angle Alpha >= 0.65mm
 Angle Alpha 0.65mm - 0.50mm
 Angle Alpha <= 0.50mm **0.098mm**

Total Corn. HOA >= 0.200μ
 Total Corn. HOA < 0.200μ **0.07μ**

Total Astig. >= 1.00D
 Total Astig. < 1.00D **0.95D**

Corneal Spherical Aberration(SA) at 6.00mm:
 <= 0.14
 0.14 - 0.20
 0.20 - 0.25 **0.24**
 0.25 - 0.30
 > 0.30

WF 10-11-2015 16:00:54
 Limbus / Pupil / Scan 11.93 / 4.15 / 3.30 mm
 Tracey Refraction **-17.00 D -3.37 D x 120°**
 HO Total 0.618 μ

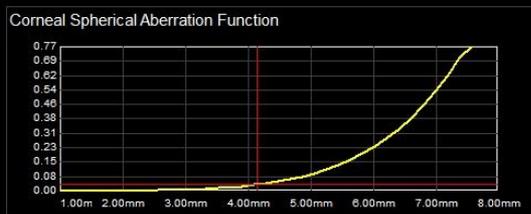
Potential Visual Complaints
 Night Myopia ++
 Blur / Double Vision ++
 Glare / Halo +
 Mixed Focus +
 Starburst +++

CT 10-11-2015 16:00:59
 Refractive Power @ D <= 3.00 mm
 Steep **44.03 D x 105°**
 Flat **43.08 D x 6°**
 Astigmatism 0.95 D x 105°
 Effective Ref Pwr @ 3.00m 43.56 D
 Corneal SphAb @ D = 6.00 mm +0.238 μ
 I-S Axial Power @ D = 6.00 mm 0.57 D

Angle A: **0.098 mm @ 21°**
 Angle K: **0.048 mm @ 53°**
 Aligned on IR dots.

CORNEA - RMS Total 3.30 mm

Z	Name	μ
3	Astigmatism	0.093
5	Astigmatism	0.256
6	Trefoil	0.028
7	Coma	0.016
8	Coma	0.009
9	Trefoil	0.055
10	Tetrafoil	0.010
11	Astigmatism	0.001
12	Spherical	0.013
13	Astigmatism	0.017
14	Tetrafoil	0.015



- ### Lenses to Consider :
- Premium IOL
 - MonoFocal Non-Toric IOL
 - Advanced Balance Curve IOL or Aspheric IOL

WF and CT Summary Display



benedicta

Group: refractiva

INTERNAL - RMS Total. no Defocus 4.30 mm

z	Name	μ	1
3	Astigmatism	0.125	<div style="width: 100%; height: 10px; background-color: red;"></div>
5	Astigmatism	0.183	<div style="width: 100%; height: 10px; background-color: red;"></div>
6	Trefoil	0.056	<div style="width: 100%; height: 10px; background-color: red;"></div>
7	Coma	0.044	<div style="width: 100%; height: 10px; background-color: blue;"></div>
8	Coma	0.196	<div style="width: 100%; height: 10px; background-color: red;"></div>
9	Trefoil	0.017	<div style="width: 100%; height: 10px; background-color: red;"></div>
10	Tetrafoil	0.010	<div style="width: 100%; height: 10px; background-color: blue;"></div>
11	Astigmatism	0.034	<div style="width: 100%; height: 10px; background-color: blue;"></div>
12	Spherical	0.036	<div style="width: 100%; height: 10px; background-color: blue;"></div>
13	Astigmatism	0.054	<div style="width: 100%; height: 10px; background-color: red;"></div>
14	Tetrafoil	0.012	<div style="width: 100%; height: 10px; background-color: blue;"></div>

TOTAL EYE - RMS Total. no Defocus 4.30 mm

z	Name	μ	1
3	Astigmatism	0.131	<div style="width: 100%; height: 10px; background-color: blue;"></div>
5	Astigmatism	0.082	<div style="width: 100%; height: 10px; background-color: red;"></div>
6	Trefoil	0.101	<div style="width: 100%; height: 10px; background-color: blue;"></div>
7	Coma	0.335	<div style="width: 100%; height: 10px; background-color: blue;"></div>
8	Coma	0.305	<div style="width: 100%; height: 10px; background-color: red;"></div>
9	Trefoil	0.002	<div style="width: 100%; height: 10px; background-color: red;"></div>
10	Tetrafoil	0.050	<div style="width: 100%; height: 10px; background-color: blue;"></div>
11	Astigmatism	0.043	<div style="width: 100%; height: 10px; background-color: blue;"></div>
12	Spherical	0.131	<div style="width: 100%; height: 10px; background-color: blue;"></div>
13	Astigmatism	0.005	<div style="width: 100%; height: 10px; background-color: red;"></div>
14	Tetrafoil	0.005	<div style="width: 100%; height: 10px; background-color: blue;"></div>

04-03-2016 16:03:10 **OD**

Limbus 10.95 mm / Pupil 5.46 mm / Scan 4.30 mm

Tracey Refraction **+2.00 D -0.25 D x 63°**

2.00 mm +1.67 D -0.47 D x 93°

3.00 mm +1.77 D -0.25 D x 80°

5.00 mm

4.30 mm +2.18 D -0.31 D x 61°

HO Total @ D <= 4.30 mm 0.493 μ

Coma 0.453 μ x 312°

Spherical Aberration - 0.131 μ

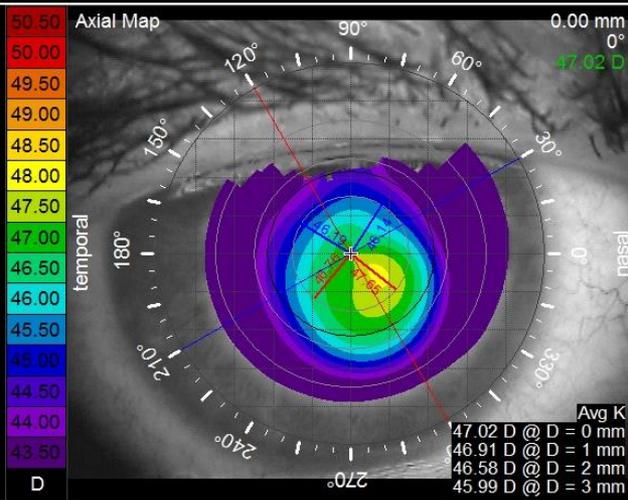
Trefoil 0.101 μ x 90°

Angle Alpha D = 0.368 mm @ 198°

Averaged Exam

CORNEA - RMS Total. no Defocus 4.30 mm

z	Name	μ	1
3	Astigmatism	0.256	<div style="width: 100%; height: 10px; background-color: blue;"></div>
5	Astigmatism	0.101	<div style="width: 100%; height: 10px; background-color: blue;"></div>
6	Trefoil	0.157	<div style="width: 100%; height: 10px; background-color: blue;"></div>
7	Coma	0.291	<div style="width: 100%; height: 10px; background-color: blue;"></div>
8	Coma	0.108	<div style="width: 100%; height: 10px; background-color: red;"></div>
9	Trefoil	0.015	<div style="width: 100%; height: 10px; background-color: blue;"></div>
10	Tetrafoil	0.039	<div style="width: 100%; height: 10px; background-color: blue;"></div>
11	Astigmatism	0.009	<div style="width: 100%; height: 10px; background-color: blue;"></div>
12	Spherical	0.095	<div style="width: 100%; height: 10px; background-color: blue;"></div>
13	Astigmatism	0.059	<div style="width: 100%; height: 10px; background-color: red;"></div>
14	Tetrafoil	0.017	<div style="width: 100%; height: 10px; background-color: red;"></div>



04-03-2016 16:02:13 **OD**

Refractive Power @ D <= 3.00 mm

Steep **47.02 D x 142°**

Flat **46.52 D x 36°**

Astigmatism 0.50 D x 142°

Effective RP 46.78 D

Central Radius / Power 7.18 mm / 47.02 D

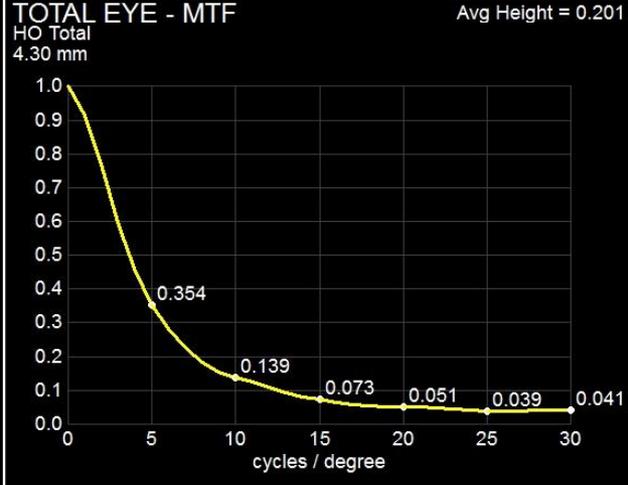
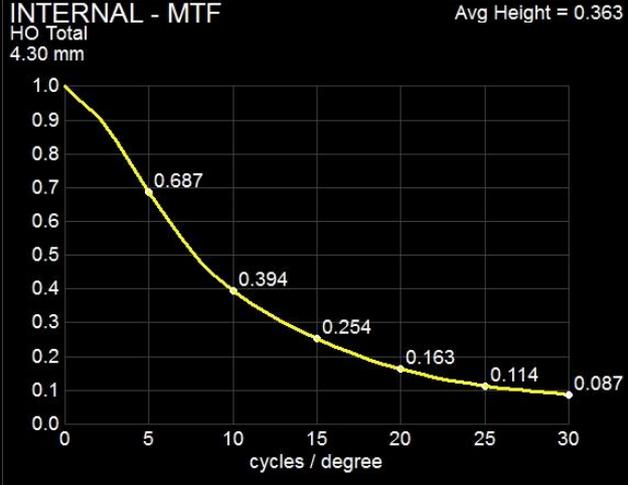
Corneal SphAb @ D = 6.00 mm +0.326 μ

I-S Axial Power @ D = 6.00 mm 1.93 D

WF and CT Summary Display



Group: refractiva



04-03-2016 16:03:10 **OD**

Limbus 10.95 mm / Pupil 5.46 mm / Scan 4.30 mm

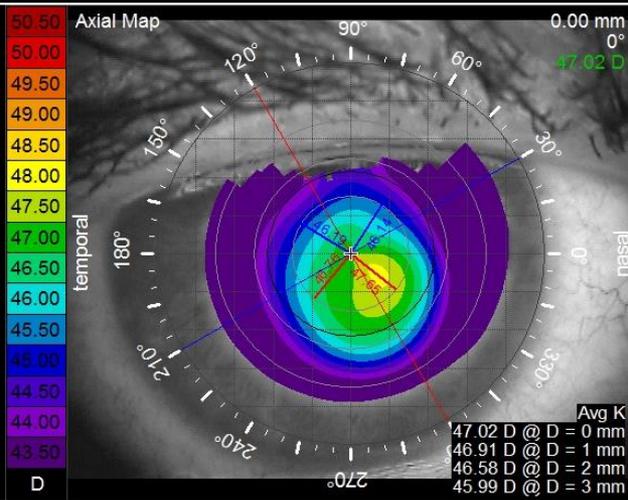
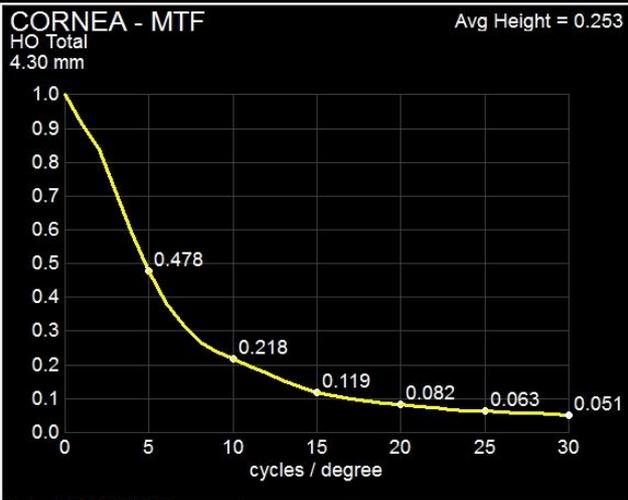
Tracey Refraction **+2.00 D -0.25 D x 63°**

2.00 mm +1.67 D -0.47 D x 93°
 3.00 mm +1.77 D -0.25 D x 80°
 5.00 mm
 4.30 mm +2.18 D -0.31 D x 61°

HO Total @ D <= 4.30 mm 0.493 μ
 Coma 0.453 μ x 312°
 Spherical Aberration -0.131 μ
 Trefoil 0.101 μ x 90°

Angle Alpha D = 0.368 mm @ 198°

Averaged Exam



04-03-2016 16:02:13 **OD**

Refractive Power @ D <= 3.00 mm

Steep 47.02 D x 142°
Flat 46.52 D x 36°
 Astigmatism 0.50 D x 142°

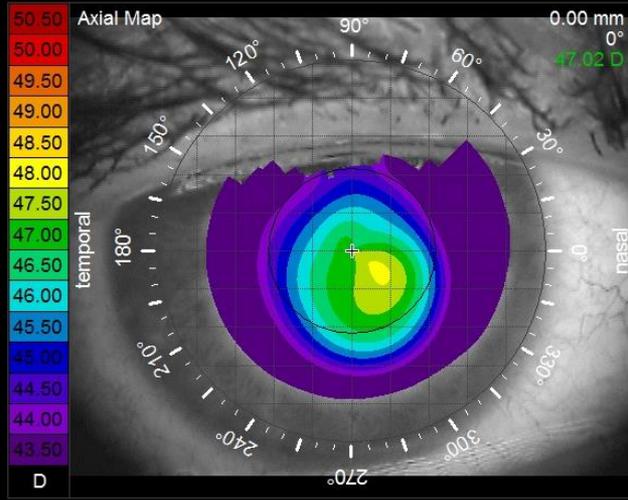
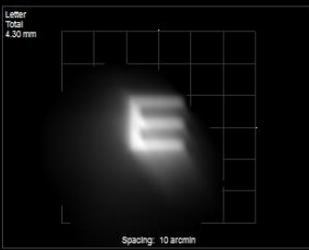
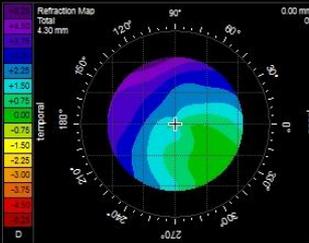
Effective RP 46.78 D

Central Radius / Power 7.18 mm / 47.02 D

Corneal SphAb @ D = 6.00 mm +0.326 μ

I-S Axial Power @ D = 6.00 mm 1.93 D

OD



TOTAL EYE - RMS Total 4.30 mm

Z Name	μ
3 Astigmatism	0.131
5 Astigmatism	0.082
6 Trefoil	0.101
7 Coma	0.335
8 Coma	0.300
9 Trefoil	0.002
10 Tetrafoil	0.050
11 Astigmatism	0.043
12 Spherical	0.131
13 Astigmatism	0.005
14 Tetrafoil	0.005

INTERNAL - RMS Total 4.30 mm

Z Name	μ
3 Astigmatism	0.125
5 Astigmatism	0.183
6 Trefoil	0.056
7 Coma	0.044
8 Coma	0.196
9 Trefoil	0.017
10 Tetrafoil	0.010
11 Astigmatism	0.034
12 Spherical	0.038
13 Astigmatism	0.054
14 Tetrafoil	0.012

IOL Selection Checklist

Is Tracey Refraction normal? Yes No

Are Corneal HOAs present? Yes No

Are Internal HOAs present? Yes No

Angle Alpha >= 0.65mm
 Angle Alpha 0.65mm - 0.50mm
 Angle Alpha <= 0.50mm **0.368mm**

Total Corn. HOA >= 0.200μ **0.37μ**
 Total Corn. HOA < 0.200μ

Total Astig. >= 1.00D
 Total Astig. < 1.00D **0.50D**

Corneal Spherical Aberration(SA) at 6.00mm:
 <= 0.14 **-0.33**
 0.14 - 0.20
 0.20 - 0.25
 0.25 - 0.30
 > 0.30

WF 04-03-2016 16:03:10
 Limbus / Pupil / Scan 10.95 / 5.46 / 4.30 mm
Tracey Refraction +2.00 D -0.25 D x 63°
 HO Total 0.493 μ
 Averaged Exam

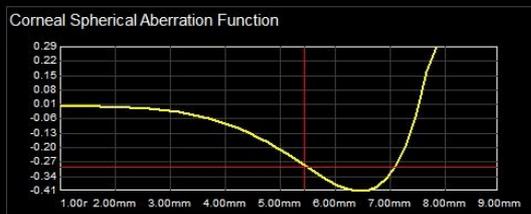
Potential Visual Complaints
 Blur / Double Vision +++
 Glare / Halo +
 Starburst +

CT 04-03-2016 16:02:13
 Refractive Power @ D <= 3.00 mm
Steep 47.02 D x 142°
Flat 46.52 D x 36°
 Astigmatism 0.50 D x 142°
 Effective Ref Pwr @ 3.00m 46.78 D
 Corneal SphAb @ D = 6.00 mm +0.326 μ
 I-S Axial Power @ D = 6.00 mm 1.93 D

Angle A: 0.368 mm @ 198°
Angle K: 0.258 mm @ 268°

CORNEA - RMS Total 4.30 mm

Z Name	μ
3 Astigmatism	0.258
5 Astigmatism	0.101
6 Trefoil	0.157
7 Coma	0.291
8 Coma	0.108
9 Trefoil	0.015
10 Tetrafoil	0.039
11 Astigmatism	0.009
12 Spherical	0.065
13 Astigmatism	0.069
14 Tetrafoil	0.017



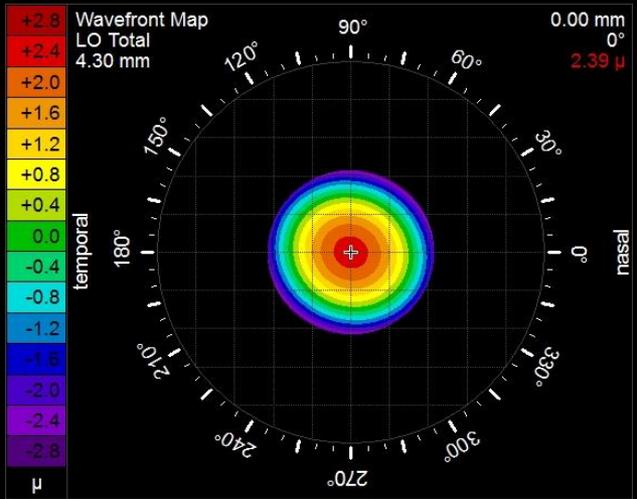
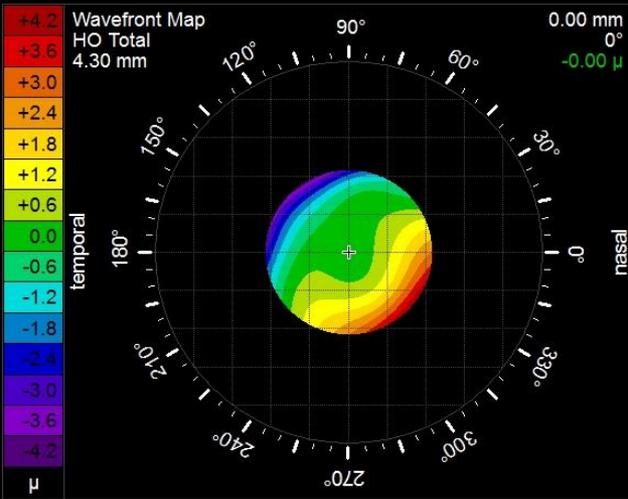
Lenses to Consider :

1. MonoFocal Non-Toric IOL
2. Spherical IOL

WF Summary Display



Group: refractiva



04-03-2016 16:03:10 OD

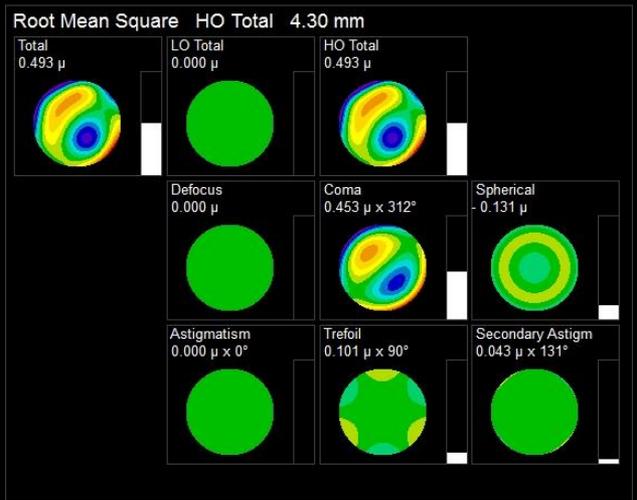
Clinic
Physician
Operator

Limbus / Pupil / Scan 10.95 / 5.46 / 4.30 mm
Fixation Target Position 0.00 D

Tracey Refraction +2.00 D -0.25 D x 63°
+1.67 D -0.47 D x 93° @ D ≤ 2.00 mm / D = 12.00 mm
+1.77 D -0.25 D x 80° @ D ≤ 3.00 mm / D = 12.00 mm
@ D ≤ 5.00 mm / D = 12.00 mm
+2.18 D -0.31 D x 61° @ D ≤ 4.30 mm / D = 12.00 mm

Root Mean Square HO Total 4.30 mm

Z	Name	μ
1		
3	Astigmatism	0.000
5	Astigmatism	0.000
6	Trefoil	0.101
7	Coma	0.335
8	Coma	0.305
9	Trefoil	0.002
10	Tetrafoil	0.050
11	Astigmatism	0.043
12	Spherical	0.131
13	Astigmatism	0.005
14	Tetrafoil	0.005



Root Mean Square @ D ≤ 4.30 mm

Total	1.475 μ
LO Total	1.390 μ
Defocus	-1.382 μ
Astigmatism	0.154 μ x 151°
HO Total	0.493 μ
Coma	0.453 μ x 312°
Spherical	-0.131 μ
Secondary Astigmatism	0.043 μ x 131°
Trefoil	0.101 μ x 90°

Averaged Exam
Angle Kappa Distance: 0.258 mm @ 268°
Angle Alpha Distance: 0.368 mm @ 198°

WF Summary Display



Group: refractiva

04-03-2016 16:03:10 OD

Clinic
Physician
Operator

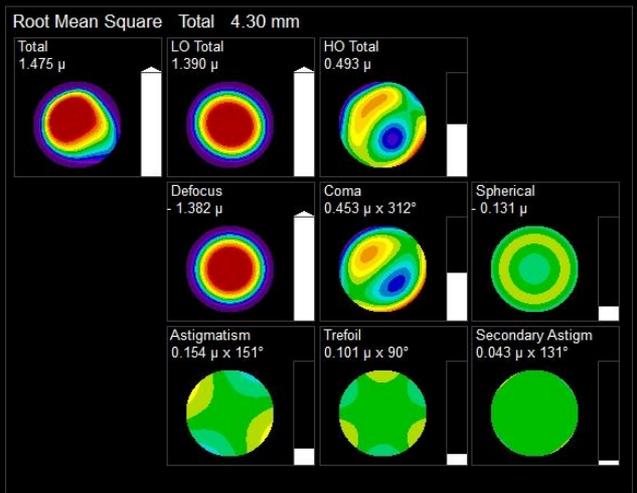
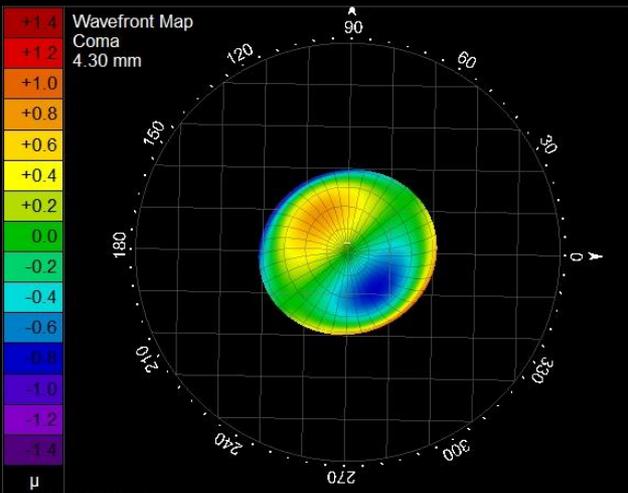
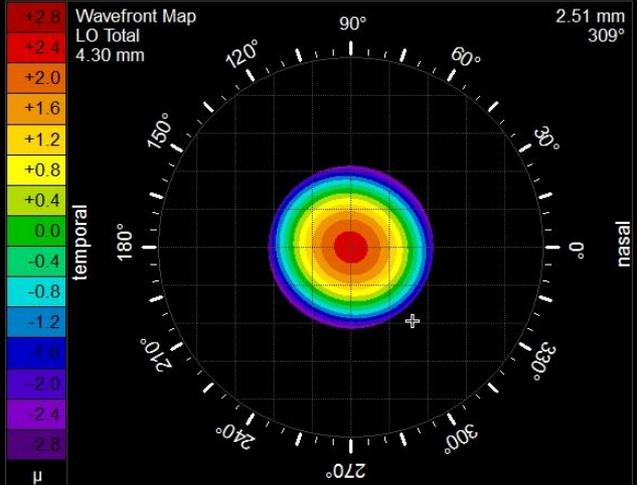
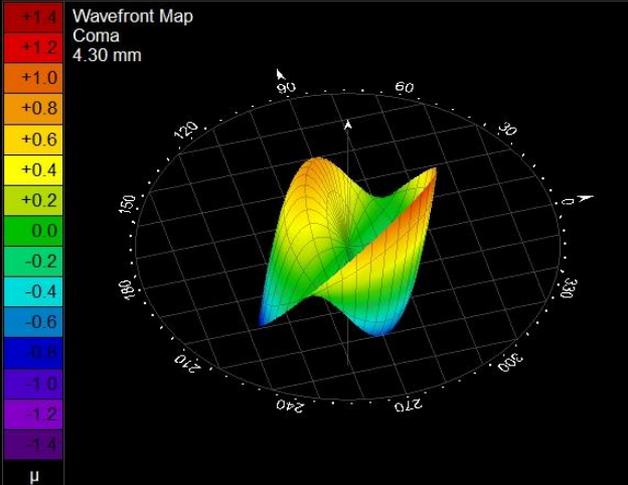
Limbus / Pupil / Scan 10.95 / 5.46 / 4.30 mm
Fixation Target Position 0.00 D

Tracey Refraction **+2.00 D -0.25 D x 63°**
 +1.67 D -0.47 D x 93° @ D ≤ 2.00 mm / D = 12.00 mm
 +1.77 D -0.25 D x 80° @ D ≤ 3.00 mm / D = 12.00 mm
 @ D ≤ 5.00 mm / D = 12.00 mm
 +2.18 D -0.31 D x 61° @ D ≤ 4.30 mm / D = 12.00 mm

Root Mean Square @ D ≤ 4.30 mm

Total	1.475 μ
LO Total	1.390 μ
Defocus	-1.382 μ
Astigmatism	0.154 μ x 151°
HO Total	0.493 μ
Coma	0.453 μ x 312°
Spherical	-0.131 μ
Secondary Astigmatism	0.043 μ x 131°
Trefoil	0.101 μ x 90°

Averaged Exam
 Angle Kappa Distance: 0.258 mm @ 268°
 Angle Alpha Distance: 0.368 mm @ 198°



WF and CT Summary Display



Group: iol toriche

INTERNAL - RMS Total. no Defocus 2.00 mm

z	Name	μ	1
3	Astigmatism	0.159	
5	Astigmatism	0.143	
6	Trefoil	0.028	
7	Coma	0.010	
8	Coma	0.001	
9	Trefoil	0.001	
10	Tetrafoil	0.003	
11	Astigmatism	0.006	
12	Spherical	0.006	
13	Astigmatism	0.001	
14	Tetrafoil	0.003	

TOTAL EYE - RMS Total. no Defocus 2.00 mm

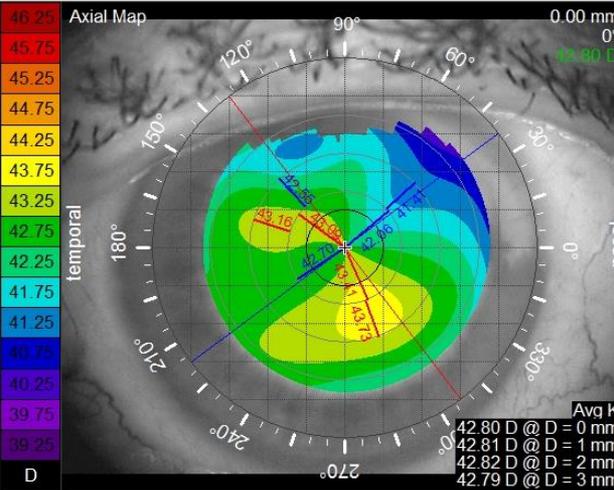
z	Name	μ	1
3	Astigmatism	0.241	
5	Astigmatism	0.168	
6	Trefoil	0.029	
7	Coma	0.005	
8	Coma	0.010	
9	Trefoil	0.002	
10	Tetrafoil	0.002	
11	Astigmatism	0.007	
12	Spherical	0.010	
13	Astigmatism	0.001	
14	Tetrafoil	0.001	

12-11-2015 12:18:53 **OD**

Limbus 11.15 mm / Pupil 3.18 mm / Scan 2.00 mm
Tracey Refraction +1.50 D -2.87 D x 28°
 2.00 mm +1.54 D -2.87 D x 28°
 3.00 mm
 5.00 mm
 2.00 mm +1.54 D -2.87 D x 28°
 HO Total @ D ≤ 2.00 mm 0.037 μ
 Coma 0.012 μ x 205°
 Spherical Aberration + 0.010 μ
 Trefoil 0.029 μ x 89°
Angle Alpha D = 0.399 mm @ 148°

CORNEA - RMS Total. no Defocus 2.00 mm

z	Name	μ	1
3	Astigmatism	0.082	
5	Astigmatism	0.025	
6	Trefoil	0.001	
7	Coma	0.015	
8	Coma	0.010	
9	Trefoil	0.001	
10	Tetrafoil	0.001	
11	Astigmatism	0.002	
12	Spherical	0.004	
13	Astigmatism	0.001	
14	Tetrafoil	0.003	



12-11-2015 12:19:00 **OD**

Refractive Power @ D ≤ 3.00 mm
Steep 43.48 D x 123°
Flat 42.55 D x 40°
 Astigmatism 0.94 D x 123°
 Effective RP 43.04 D
 Central Radius / Power 7.89 mm / 42.80 D
 Corneal SphAb @ D = 6.00 mm +0.202 μ
 I-S Axial Power @ D = 6.00 mm 1.25 D

INTERNAL - RMS Total. no Defocus 3.90 mm

z	Name	μ	1
3	Astigmatism	0.660	[Bar]
5	Astigmatism	0.772	[Bar]
6	Trefoil	0.058	[Bar]
7	Coma	0.035	[Bar]
8	Coma	0.073	[Bar]
9	Trefoil	0.006	[Bar]
10	Tetrafoil	0.022	[Bar]
11	Astigmatism	0.026	[Bar]
12	Spherical	0.068	[Bar]
13	Astigmatism	0.034	[Bar]
14	Tetrafoil	0.034	[Bar]

TOTAL EYE - RMS Total. no Defocus 3.90 mm

z	Name	μ	1
3	Astigmatism	1.057	[Bar]
5	Astigmatism	1.005	[Bar]
6	Trefoil	0.024	[Bar]
7	Coma	0.089	[Bar]
8	Coma	0.048	[Bar]
9	Trefoil	0.027	[Bar]
10	Tetrafoil	0.019	[Bar]
11	Astigmatism	0.042	[Bar]
12	Spherical	0.046	[Bar]
13	Astigmatism	0.035	[Bar]
14	Tetrafoil	0.024	[Bar]

04-12-2015 13:16:40 **OD**

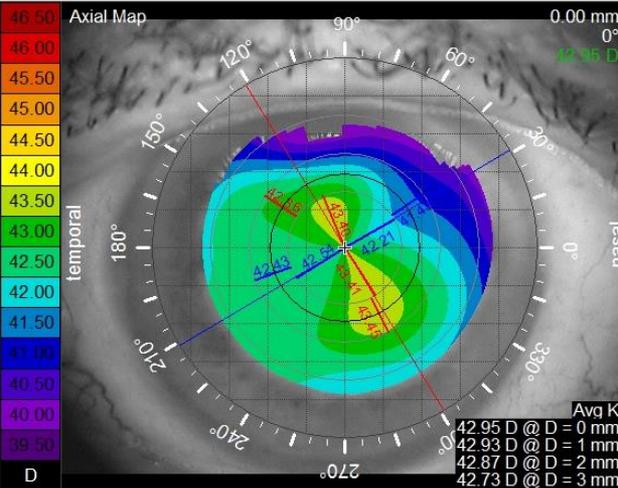
Limbus 10.95 mm / Pupil 5.29 mm / Scan 3.90 mm
Tracey Refraction **+1.50 D -3.75 D x 23°**
 2.00 mm +1.03 D -3.49 D x 19°
 3.00 mm +1.40 D -3.76 D x 21°
 5.00 mm
 3.90 mm +1.55 D -3.79 D x 23°

HO Total @ D <= 3.90 mm 0.150 μ
 Coma 0.101 μ x 298°
 Spherical Aberration - 0.046 μ
 Trefoil 0.036 μ x 74°

Angle Alpha D = 0.266 mm @ 204°

CORNEA - RMS Total. no Defocus 3.90 mm

z	Name	μ	1
3	Astigmatism	0.397	[Bar]
5	Astigmatism	0.233	[Bar]
6	Trefoil	0.082	[Bar]
7	Coma	0.054	[Bar]
8	Coma	0.025	[Bar]
9	Trefoil	0.021	[Bar]
10	Tetrafoil	0.003	[Bar]
11	Astigmatism	0.016	[Bar]
12	Spherical	0.022	[Bar]
13	Astigmatism	0.001	[Bar]
14	Tetrafoil	0.010	[Bar]



04-12-2015 13:16:49 **OD**

Refractive Power @ D <= 3.00 mm
Steep 43.67 D x 118°
Flat 42.50 D x 31°
 Astigmatism 1.18 D x 118°

Effective RP 43.08 D

Central Radius / Power 7.86 mm / 42.95 D

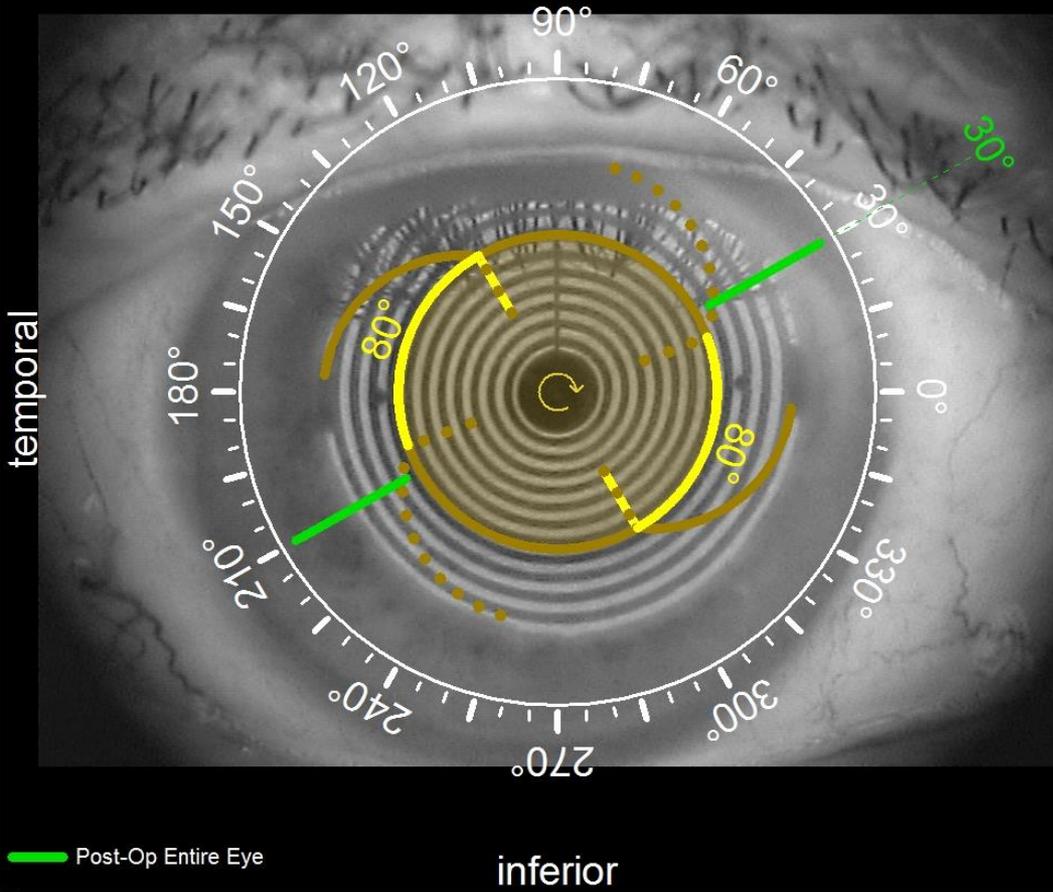
Corneal SphAb @ D = 6.00 mm +0.071 μ

I-S Axial Power @ D = 6.00 mm 0.97 D



Toric IOL Enhancement superior
 Rotate 80° clock-wise

Scale Range : 0° - 180°



temporal

inferior

nasal

Post-Op Entire Eye

04-12-2015 13:16:49 OD

Clinic
 Physician
 Operator
 Limbus / Pupil 11.45 / --- mm
 Refractive Power @ D <= 3.00 mm

Steep	43.67 D x 118°
Flat	42.50 D x 31°
Astigmatism	1.18 D x 118°
Effective	43.08 D

Sim K @ D = 3.00 mm

Steep	7.78 mm / 43.36 D x 121°
Flat	8.02 mm / 42.10 D x 31°
Delta	1.25 D x 121°
Average	7.90 mm / 42.72 D

Central Radius / Power 7.86 mm / 42.95 D
 Best Fit Sphere R0 = 8.04 mm
 Best Fit Conicoid R0 = 7.83 mm Q = -0.44 e = 0.66
 Corneal SphAb @ D = 6.00 mm +0.071 μ
 I-S Axial Power @ D = 6.00 mm 0.97 D

Pre-Op Corneal Astigmatism	1.19 D x 120°
Pre-Op Internal Optics Astigmatism	2.62 D x 110°
Pre-Op Entire Eye Astigmatism	3.76 D x 113°

Post-Op Corneal Astigmatism	1.19 D x 120°
Post-Op Internal Optics Astigmatism	2.62 D x 30°
Post-Op Entire Eye Astigmatism	1.43 D x 30°

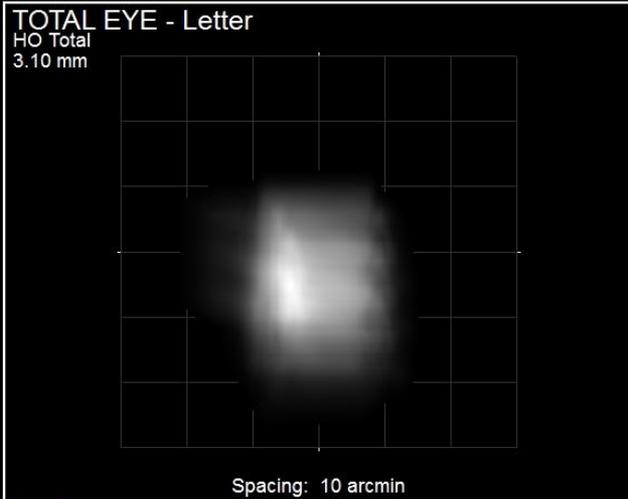
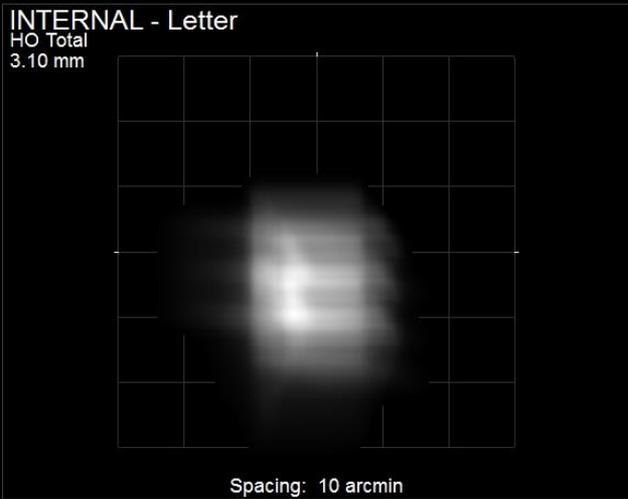
WF and CT Summary Display



Amelia

Group: Sample Set

Exams not taken at the same time



09-11-2012 08:52:50 **OS**

Limbus 10.07 mm / Pupil 8.31 mm / Scan 3.10 mm

Tracey Refraction **+1.50 D -2.00 D x 107°**

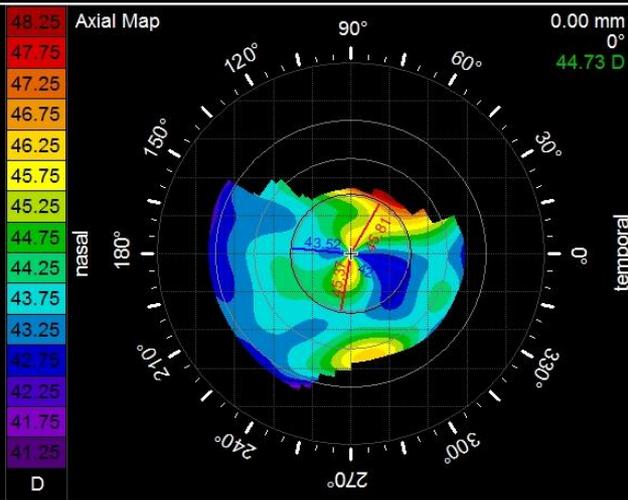
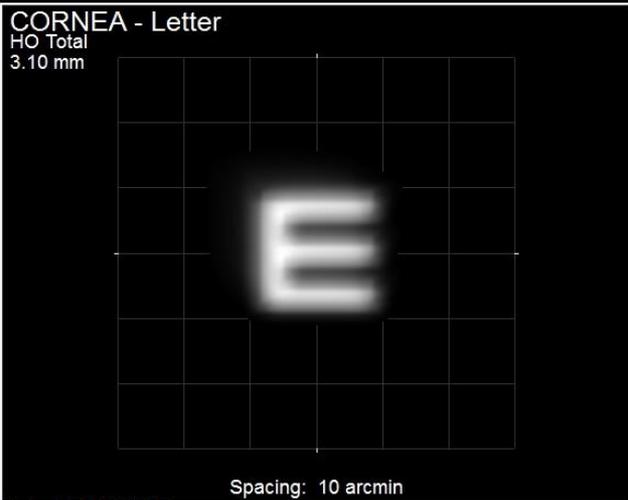
2.00 mm	+1.94 D -3.46 D x 111°
3.00 mm	+1.60 D -2.11 D x 107°
5.00 mm	
3.10 mm	+1.56 D -1.98 D x 107°

HO Total @ D <= 3.10 mm 0.489 μ

Coma	0.211 μ x 302°
Spherical Aberration	- 0.038 μ
Trefoil	0.368 μ x 28°

Angle Alpha D = **0.410 mm @ 3°**

<-----



09-11-2012 08:49:48 **OS**

Refractive Power @ D <= 3.00 mm

Steep	45.64 D x 62°
Flat	43.36 D x 163°
Astigmatism	2.28 D x 62°

Effective RP 44.55 D

Central Radius / Power 7.55 mm / 44.73 D

Corneal SphAb @ D = 6.00 mm +1.747 μ

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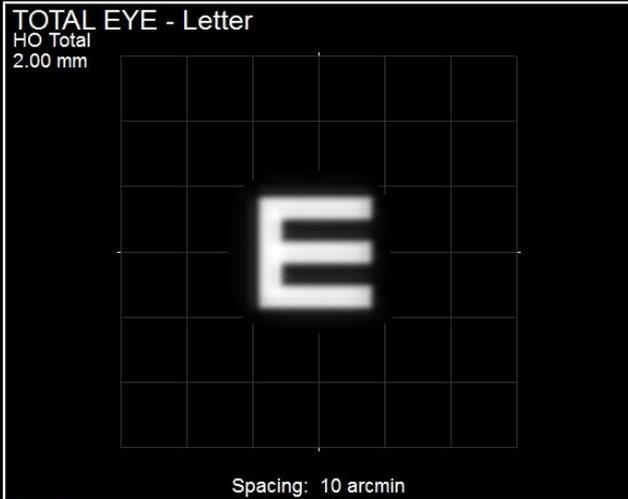
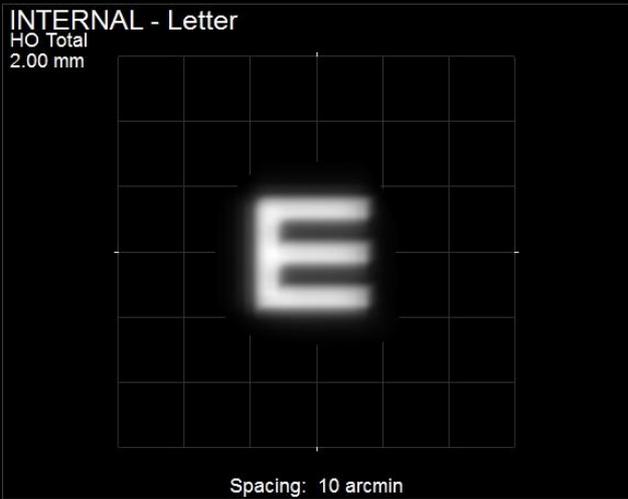
WF and CT Summary Display



Amelia

Group: Sample Set

Exams not taken at the same time



09-11-2012 10:25:25 **OS**

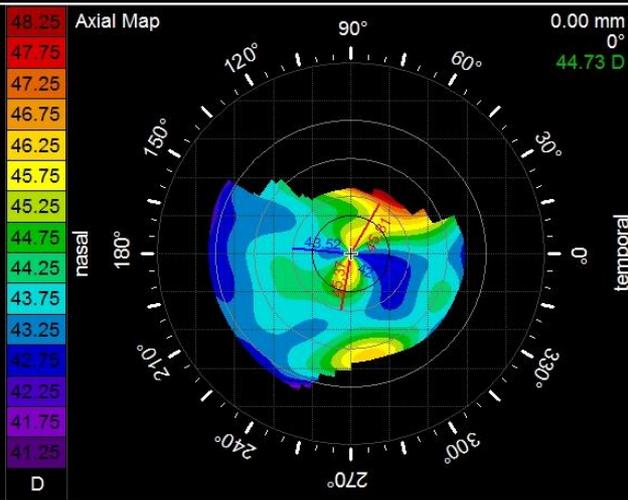
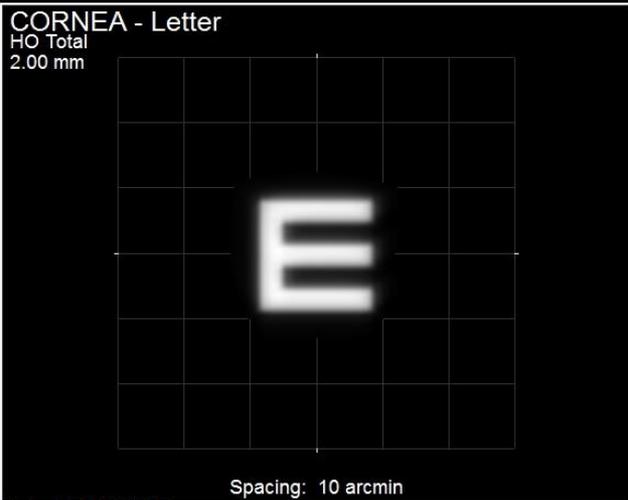
Limbus 10.09 mm / Pupil 8.45 mm / Scan 2.00 mm

Tracey Refraction **+1.12 D -1.00 D x 13°**
 2.00 mm +1.12 D -0.96 D x 13°
 3.00 mm
 5.00 mm
 2.00 mm +1.12 D -0.96 D x 13°

HO Total @ D <= 2.00 mm 0.059 μ
 Coma 0.015 μ x 25°
 Spherical Aberration + 0.004 μ
 Trefoil 0.041 μ x 104°

Angle Alpha D = 0.671 mm @ 22°

ruotata



09-11-2012 08:49:48 **OS**

Refractive Power @ D <= 3.00 mm

Steep **45.64 D x 62°**
Flat **43.36 D x 163°**
 Astigmatism 2.28 D x 62°

Effective RP 44.55 D

Central Radius / Power 7.55 mm / 44.73 D

Corneal SphAb @ D = 6.00 mm +1.747 μ

←-----

WF and CT Summary Display



Group: notte visione

INTERNAL - RMS HO Total 4.40 mm

z	Name	μ	1
3	Astigmatism	0.000	
5	Astigmatism	0.000	
6	Trefoil	0.095	█
7	Coma	0.016	█
8	Coma	0.116	█
9	Trefoil	0.001	
10	Tetrafoil	0.007	█
11	Astigmatism	0.028	█
12	Spherical	0.020	█
13	Astigmatism	0.023	█
14	Tetrafoil	0.026	█

TOTAL EYE - RMS HO Total 4.40 mm

z	Name	μ	1
3	Astigmatism	0.000	
5	Astigmatism	0.000	
6	Trefoil	0.163	█
7	Coma	0.029	█
8	Coma	0.067	█
9	Trefoil	0.128	█
10	Tetrafoil	0.002	
11	Astigmatism	0.003	
12	Spherical	0.001	
13	Astigmatism	0.020	█
14	Tetrafoil	0.007	█

19-09-2015 15:19:16 **OD**

Limbus 10.95 mm / Pupil 5.56 mm / Scan 4.40 mm

Tracey Refraction **+2.37 D -0.62 D x 7°**

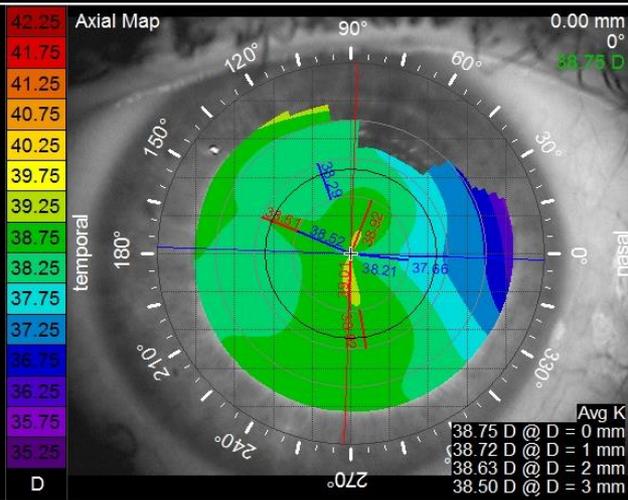
2.00 mm +2.53 D -0.96 D x 6°
 3.00 mm +2.39 D -0.71 D x 7°
 5.00 mm
 4.40 mm +2.32 D -0.57 D x 7°

HO Total @ D <= 4.40 mm 0.232 μ
 Coma 0.073 μ x 337°
 Spherical Aberration + 0.001 μ
 Trefoil 0.208 μ x 43°

Angle Alpha D = 0.024 mm @ 232°

CORNEA - RMS HO Total 4.40 mm

z	Name	μ	1
3	Astigmatism	0.000	
5	Astigmatism	0.000	
6	Trefoil	0.068	█
7	Coma	0.045	█
8	Coma	0.050	█
9	Trefoil	0.128	█
10	Tetrafoil	0.009	█
11	Astigmatism	0.024	█
12	Spherical	0.021	█
13	Astigmatism	0.003	
14	Tetrafoil	0.019	█



19-09-2015 15:19:37 **OD**

Refractive Power @ D <= 3.00 mm

Steep 39.08 D x 79°
Flat 38.47 D x 174°
 Astigmatism 0.62 D x 79°

Effective RP 38.78 D

Central Radius / Power 8.71 mm / 38.75 D

Corneal SphAb @ D = 6.00 mm +0.113 μ

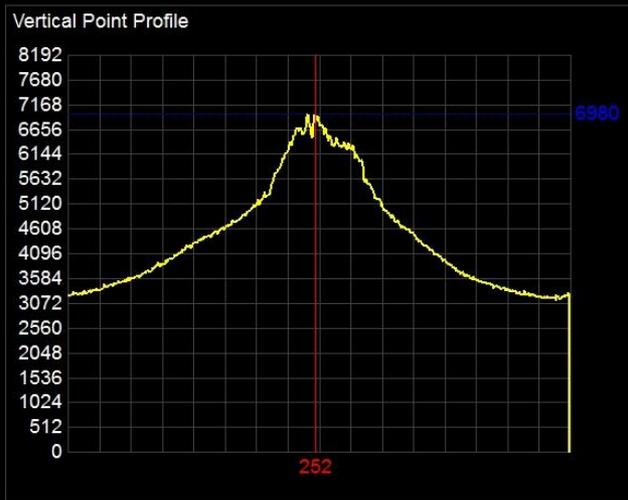
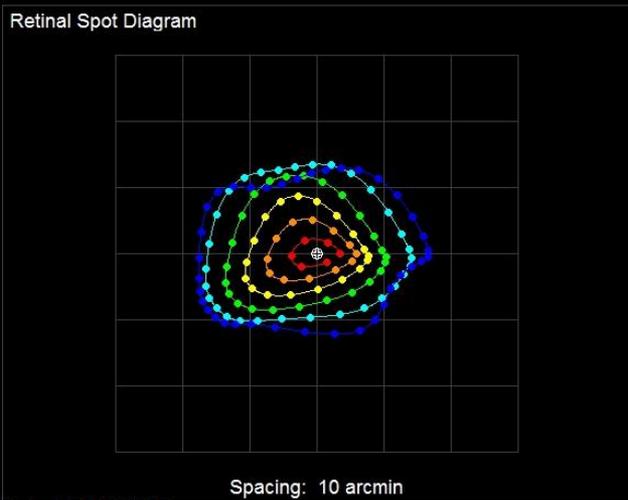
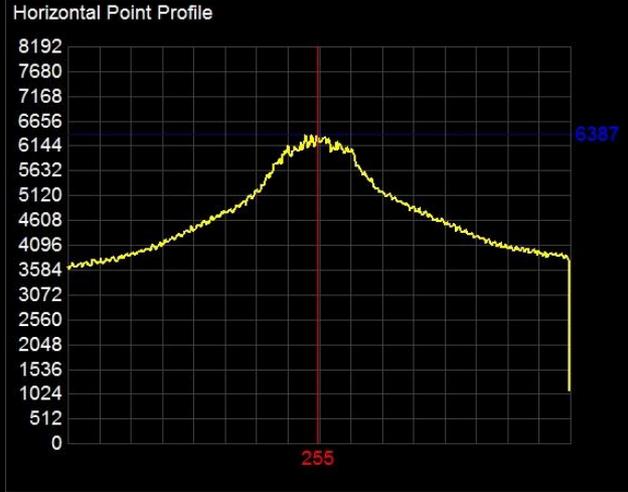
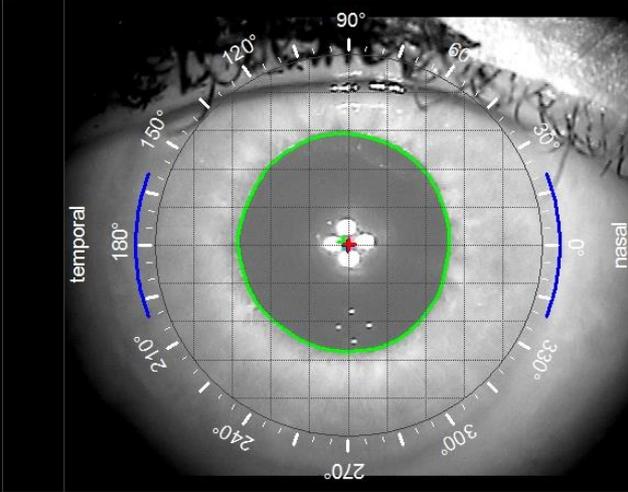
I-S Axial Power @ D = 6.00 mm 0.32 D

WF Verification Display



Point 1

Group: notte visione



19-09-2015 15:19:16 OD

Clinic
Physician
Operator

Limbus / Pupil / Scan 10.95 / 5.56 / 4.40 mm
Fixation Target Position + 7.25 D

Tracey Refraction **+2.37 D -0.62 D x 7°**

+2.53 D	-0.96 D x	6° @ D ≤ 2.00 mm	VD = 12.00 mm
+2.39 D	-0.71 D x	7° @ D ≤ 3.00 mm	VD = 12.00 mm
		@ D ≤ 5.00 mm	VD = 12.00 mm
+2.32 D	-0.57 D x	7° @ D ≤ 4.40 mm	VD = 12.00 mm

Root Mean Square @ D ≤ 4.40 mm

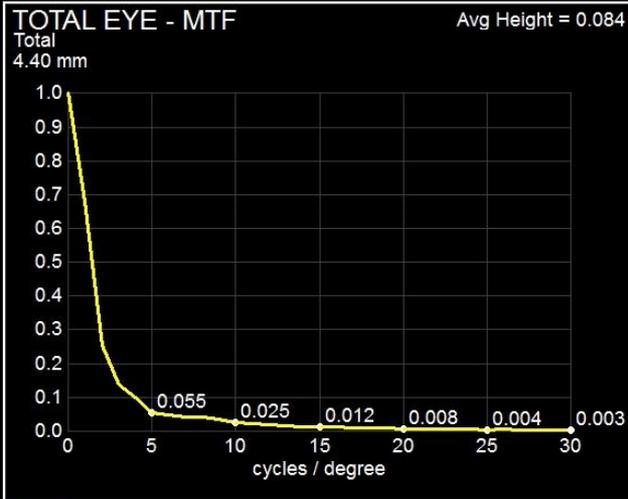
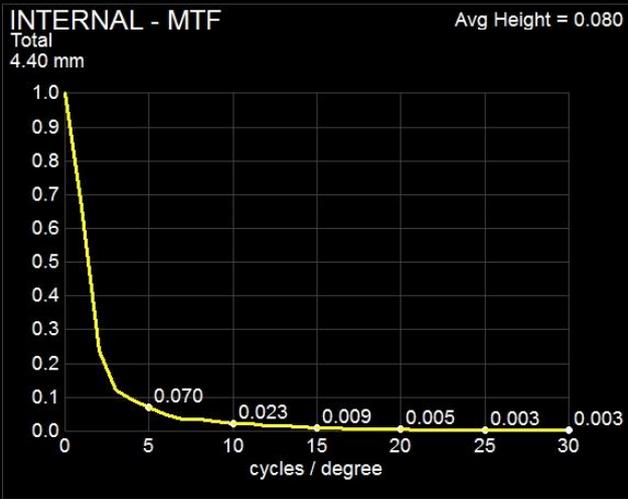
Total	1.508 μ
LO Total	1.490 μ
Defocus	-1.460 μ
Astigmatism	0.297 μ x 97°
HO Total	0.232 μ
Coma	0.073 μ x 337°
Spherical	+ 0.001 μ
Secondary Astigmatism	0.020 μ x 4°
Trefoil	0.208 μ x 43°

Aligned on IR dots.
Angle Kappa Distance: 0.135 mm @ 159°
Angle Alpha Distance: 0.024 mm @ 232°

WF and CT Summary Display



Group: notte visione



19-09-2015 15:19:16 **OD**

Limbus 10.95 mm / Pupil 5.56 mm / Scan 4.40 mm

Tracey Refraction

2.00 mm	+2.37 D -0.62 D x 7°
3.00 mm	+2.53 D -0.96 D x 6°
5.00 mm	+2.39 D -0.71 D x 7°
4.40 mm	+2.32 D -0.57 D x 7°

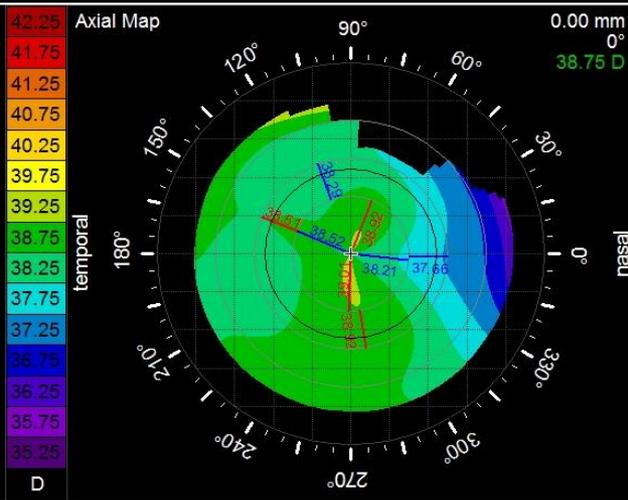
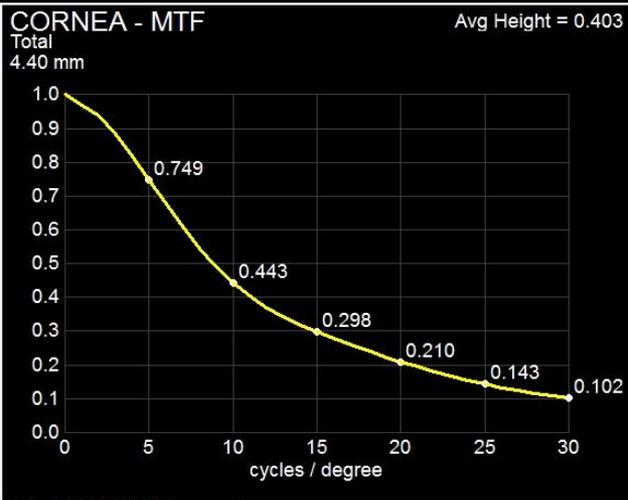
HO Total @ D <= 4.40 mm 0.232 μ

Coma 0.073 μ x 337°

Spherical Aberration + 0.001 μ

Trefoil 0.208 μ x 43°

Angle Alpha D = 0.024 mm @ 232°



19-09-2015 15:19:37 **OD**

Refractive Power @ D <= 3.00 mm

Steep	39.08 D x 79°
Flat	38.47 D x 174°
Astigmatism	0.62 D x 79°

Effective RP 38.78 D

Central Radius / Power 8.71 mm / 38.75 D

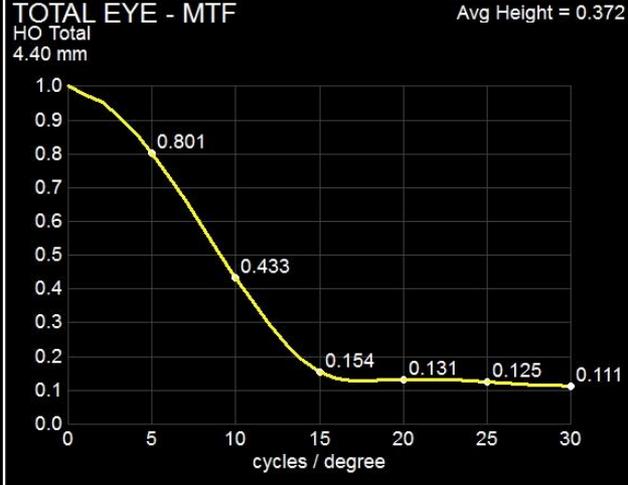
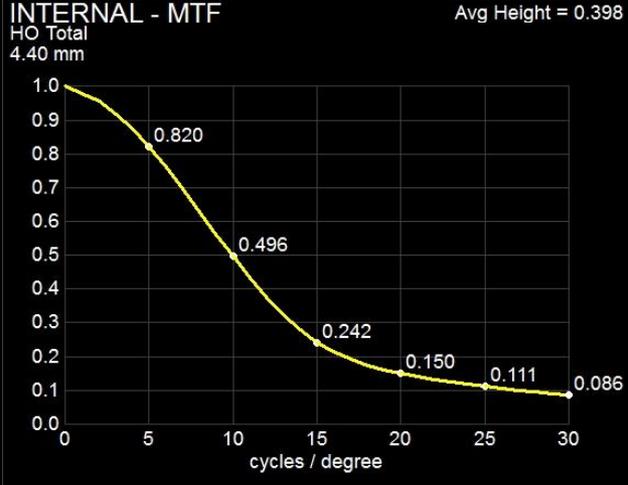
Corneal SphAb @ D = 6.00 mm +0.113 μ

I-S Axial Power @ D = 6.00 mm 0.32 D

WF and CT Summary Display



Group: notte visione



19-09-2015 15:19:16 **OD**

Limbus 10.95 mm / Pupil 5.56 mm / Scan 4.40 mm

Tracey Refraction

2.00 mm	+2.37 D -0.62 D x 7°
3.00 mm	+2.53 D -0.96 D x 6°
5.00 mm	+2.39 D -0.71 D x 7°
4.40 mm	+2.32 D -0.57 D x 7°

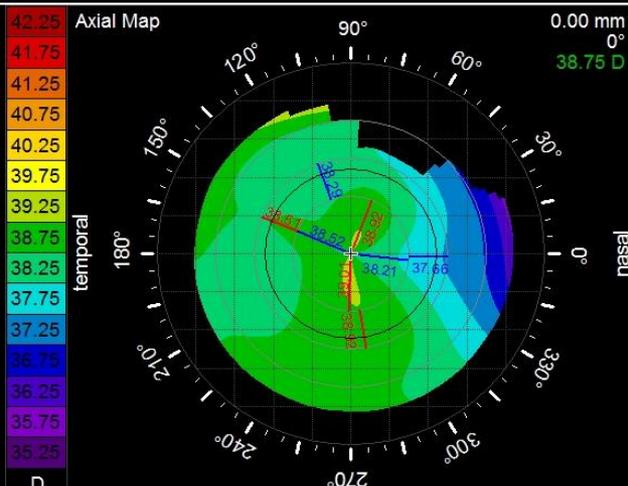
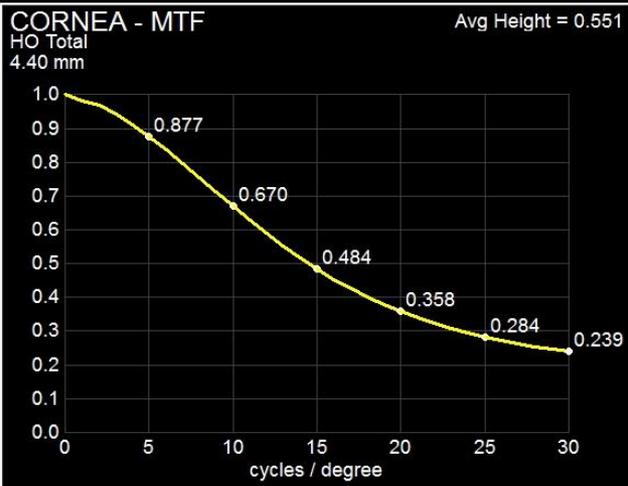
HO Total @ D <= 4.40 mm 0.232 μ

Coma 0.073 μ x 337°

Spherical Aberration + 0.001 μ

Trefoil 0.208 μ x 43°

Angle Alpha D = 0.024 mm @ 232°



19-09-2015 15:19:37 **OD**

Refractive Power @ D <= 3.00 mm

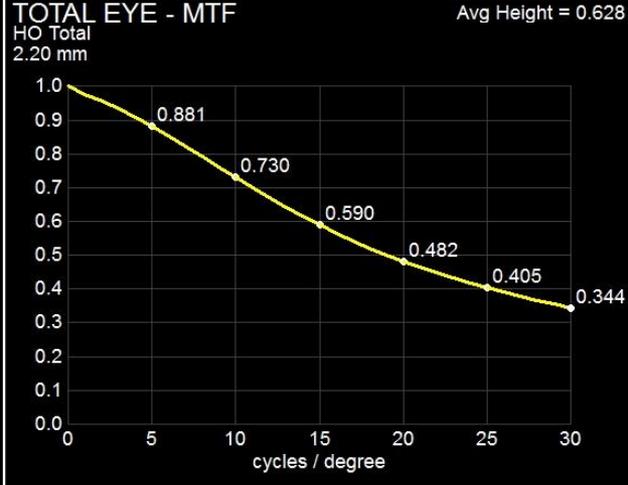
Steep	39.08 D x 79°
Flat	38.47 D x 174°
Astigmatism	0.62 D x 79°

Effective RP 38.78 D

Central Radius / Power 8.71 mm / 38.75 D

Corneal SphAb @ D = 6.00 mm +0.113 μ

I-S Axial Power @ D = 6.00 mm 0.32 D



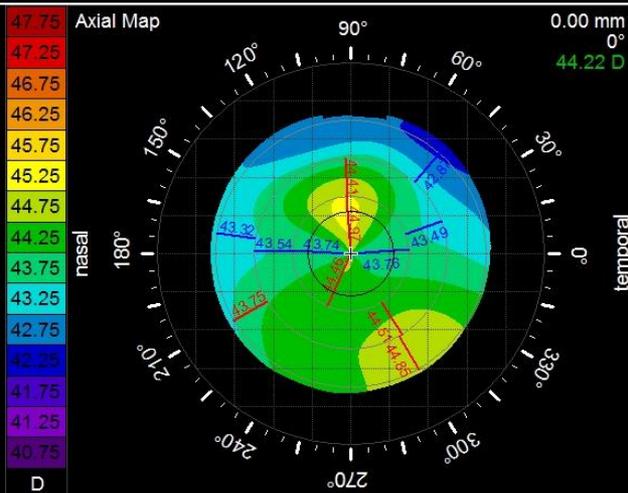
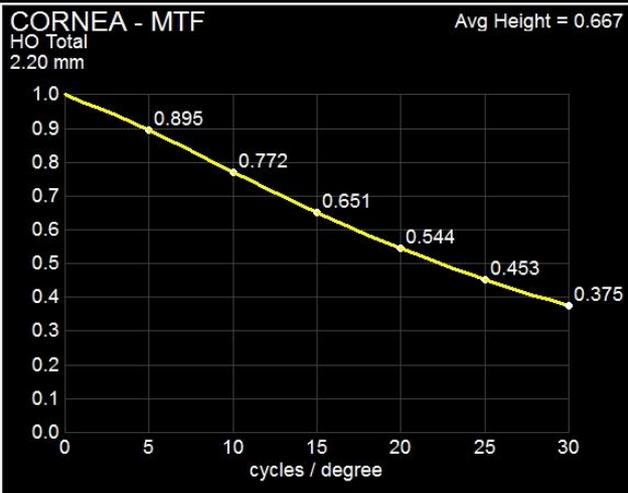
29-09-2015 11:13:28 **OS**

Limbus 11.61 mm / Pupil 3.76 mm / Scan 2.20 mm

Tracey Refraction **-0.50 D -1.00 D x 28°**
 2.00 mm **-0.46 D -0.93 D x 28°**
 3.00 mm
 5.00 mm
 2.20 mm **-0.46 D -0.94 D x 28°**

HO Total @ D <= 2.20 mm **0.044 μ**
 Coma **0.022 μ x 359°**
 Spherical Aberration **+ 0.003 μ**
 Trefoil **0.033 μ x 105°**

Angle Alpha D = 0.535 mm @ 23°



29-09-2015 11:13:56 **OS**

Refractive Power @ D <= 3.00 mm

Steep 44.96 D x 88°
Flat 43.95 D x 1°
 Astigmatism **1.00 D x 88°**

Effective RP **44.49 D**

Central Radius / Power **7.63 mm / 44.22 D**

Corneal SphAb @ D = 6.00 mm **+0.222 μ**

I-S Axial Power @ D = 6.00 mm **0.47 D**

INTERNAL - RMS Total 4.40 mm

z	Name	μ	1
3	Astigmatism	0.070	
5	Astigmatism	0.164	
6	Trefoil	0.010	
7	Coma	0.083	
8	Coma	0.005	
9	Trefoil	0.044	
10	Tetrafoil	0.003	
11	Astigmatism	0.017	
12	Spherical	0.083	
13	Astigmatism	0.043	
14	Tetrafoil	0.000	

TOTAL EYE - RMS Total 4.40 mm

z	Name	μ	1
3	Astigmatism	0.338	
5	Astigmatism	0.460	
6	Trefoil	0.037	
7	Coma	0.148	
8	Coma	0.117	
9	Trefoil	0.136	
10	Tetrafoil	0.039	
11	Astigmatism	0.027	
12	Spherical	0.015	
13	Astigmatism	0.034	
14	Tetrafoil	0.041	

13-01-2016 11:54:14 **OD**

Limbus 11.49 mm / Pupil 5.79 mm / Scan 4.40 mm

Tracey Refraction -0.62 D -1.12 D x 20°

2.00 mm -0.45 D -1.07 D x 27°

3.00 mm -0.58 D -1.14 D x 23°

5.00 mm

4.40 mm -0.64 D -1.19 D x 18°

HO Total @ D <= 4.40 mm 0.254 μ

Coma 0.189 μ x 308°

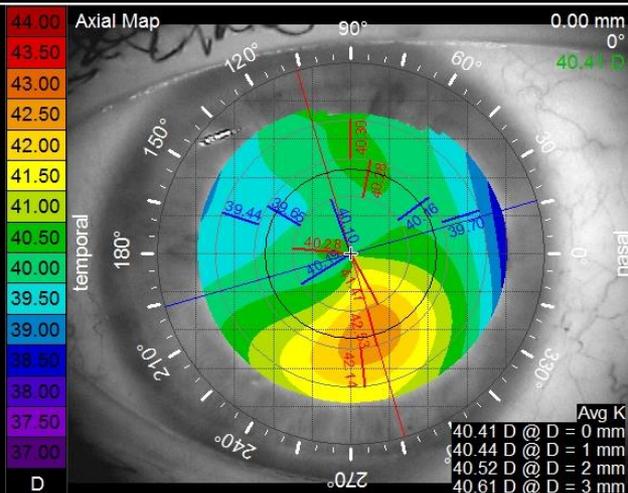
Spherical Aberration + 0.015 μ

Trefoil 0.141 μ x 55°

Angle Alpha D = 0.425 mm @ 209°

CORNEA - RMS Total 4.40 mm

z	Name	μ	1
3	Astigmatism	0.268	
5	Astigmatism	0.296	
6	Trefoil	0.047	
7	Coma	0.231	
8	Coma	0.113	
9	Trefoil	0.180	
10	Tetrafoil	0.036	
11	Astigmatism	0.011	
12	Spherical	0.098	
13	Astigmatism	0.077	
14	Tetrafoil	0.041	



13-01-2016 11:54:22 **OD**

Refractive Power @ D <= 3.00 mm

Steep 41.08 D x 112°

Flat 40.40 D x 35°

Astigmatism 0.68 D x 112°

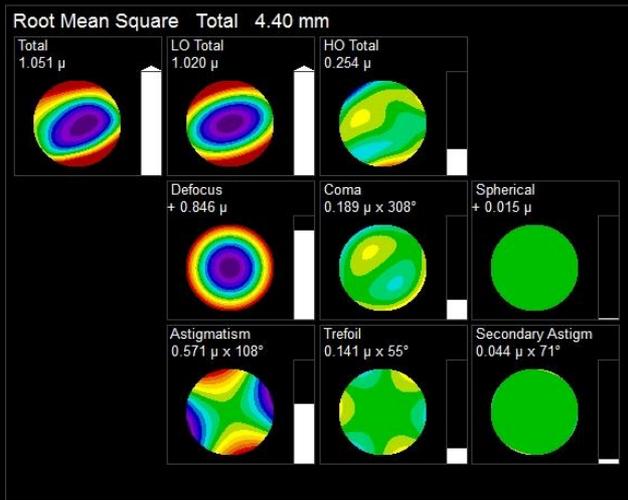
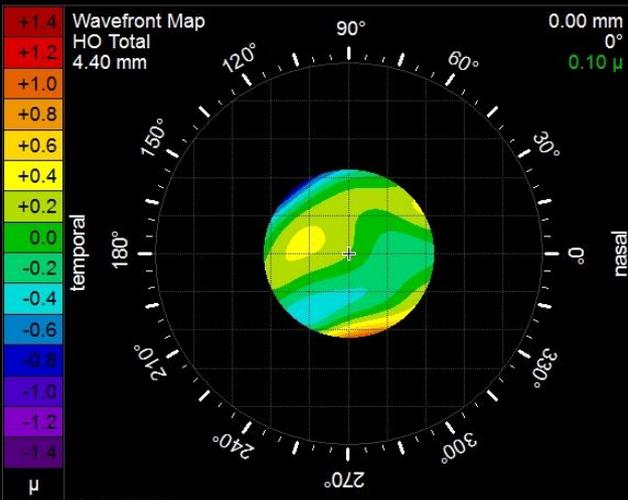
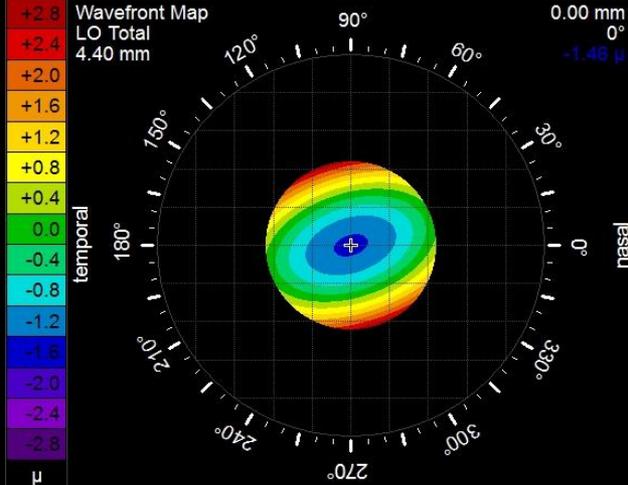
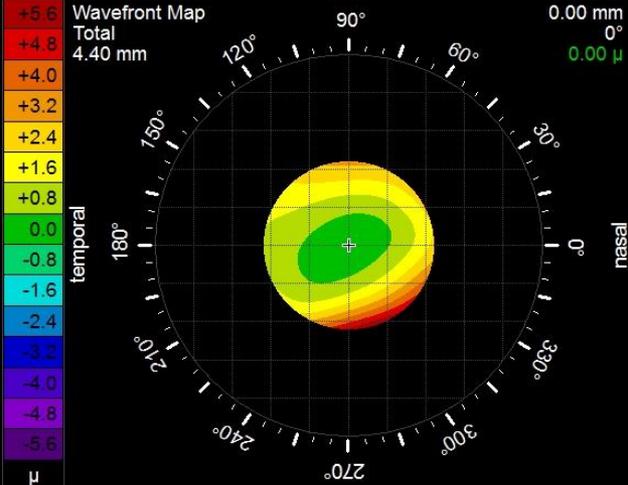
Effective RP 40.73 D

Central Radius / Power 8.35 mm / 40.41 D

Corneal SphAb @ D = 6.00 mm +0.268 μ

I-S Axial Power @ D = 6.00 mm 1.49 D

WF Summary Display



13-01-2016 11:54:14 OD

Clinic
Physician
Operator

Limbus / Pupil / Scan 11.49 / 5.79 / 4.40 mm
Fixation Target Position + 7.25 D

Tracey Refraction -0.62 D -1.12 D x 20°
-0.45 D -1.07 D x 27° @ D <= 2.00 mm / D = 12.00 mm
-0.58 D -1.14 D x 23° @ D <= 3.00 mm / D = 12.00 mm
 @ D <= 5.00 mm / D = 12.00 mm
-0.64 D -1.19 D x 18° @ D <= 4.40 mm / D = 12.00 mm

Root Mean Square @ D <= 4.40 mm

Total	1.051 μ
LO Total	1.020 μ
Defocus	+ 0.846 μ
Astigmatism	0.571 μ x 108°
HO Total	0.254 μ
Coma	0.189 μ x 308°
Spherical	+ 0.015 μ
Secondary Astigmatism	0.044 μ x 71°
Trefoil	0.141 μ x 55°

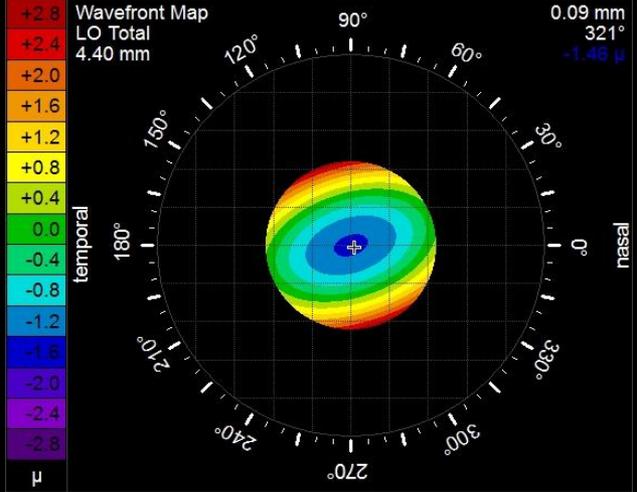
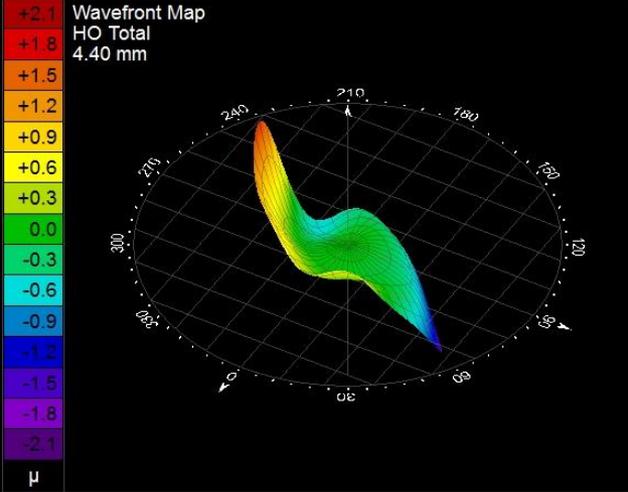
Aligned on IR dots.
Angle Kappa Distance: 0.280 mm @ 177°
Angle Alpha Distance: 0.425 mm @ 209°

WF Summary Display



manuel

Group: carbonara



13-01-2016 11:54:14 OD

Clinic
Physician
Operator

Limbus / Pupil / Scan 11.49 / 5.79 / 4.40 mm
Fixation Target Position + 7.25 D

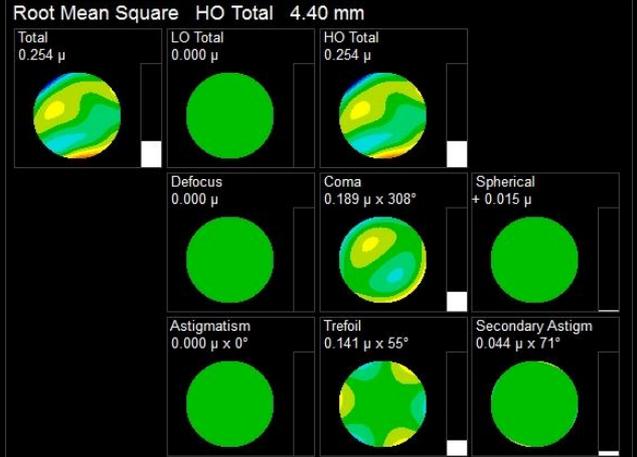
Tracey Refraction -0.62 D -1.12 D x 20°
-0.45 D -1.07 D x 27° @ D <= 2.00 mm / D = 12.00 mm
-0.58 D -1.14 D x 23° @ D <= 3.00 mm / D = 12.00 mm
 @ D <= 5.00 mm / D = 12.00 mm
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Root Mean Square @ D <= 4.40 mm

Total	1.051 μ
LO Total	1.020 μ
Defocus	+ 0.846 μ
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HO Total	0.254 μ
Coma	0.189 μ x 308°
Spherical	+ 0.015 μ
Secondary Astigmatism	0.044 μ x 71°
Trefoil	0.141 μ x 55°

Root Mean Square HO Total 4.40 mm

Z	Name	μ	
1			1
3	Astigmatism	0.000	
5	Astigmatism	0.000	
6	Trefoil	0.037	
7	Coma	0.148	
8	Coma	0.117	
9	Trefoil	0.136	
10	Tetrafoil	0.039	
11	Astigmatism	0.027	
12	Spherical	0.015	
13	Astigmatism	0.034	
14	Tetrafoil	0.041	



Aligned on IR dots.
Angle Kappa Distance: 0.280 mm @ 177°
Angle Alpha Distance: 0.425 mm @ 209°



Aberrometria e topografia:

- Selezione della IOL
- Scelta del candidato ideale
- Evitare errori imprevedibili