MARKET ANALYSIS

ENG. ARAS KAMAL MESLEM

PENTACAM

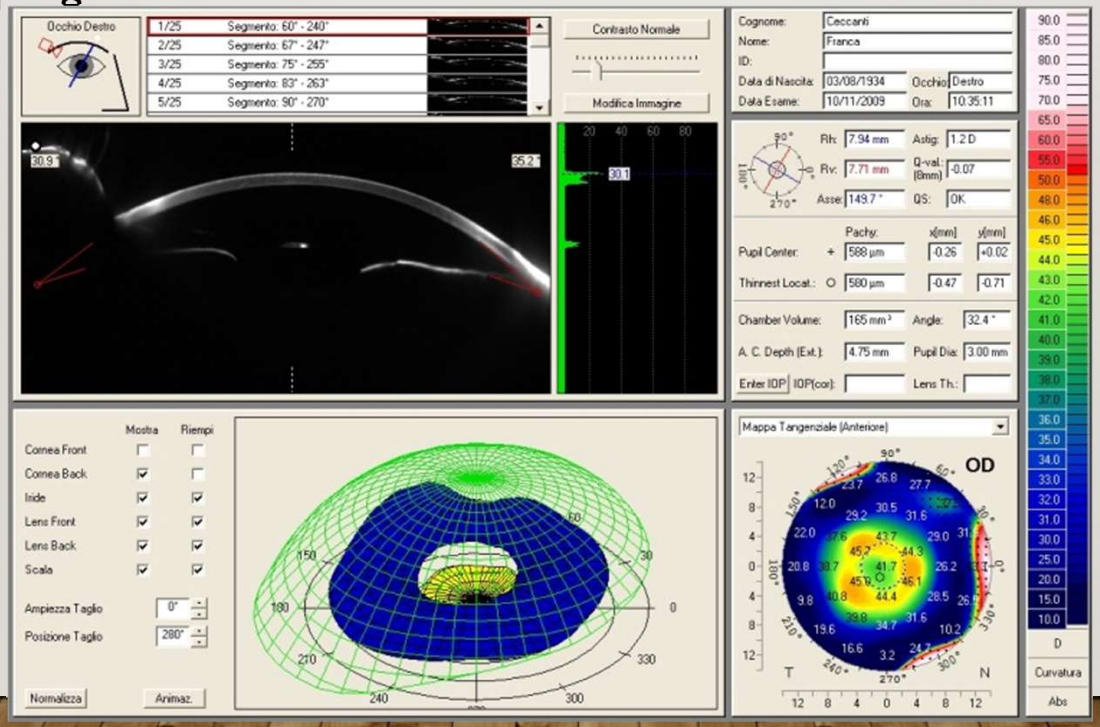
- Three Models
- Normal
- HR
- AXL

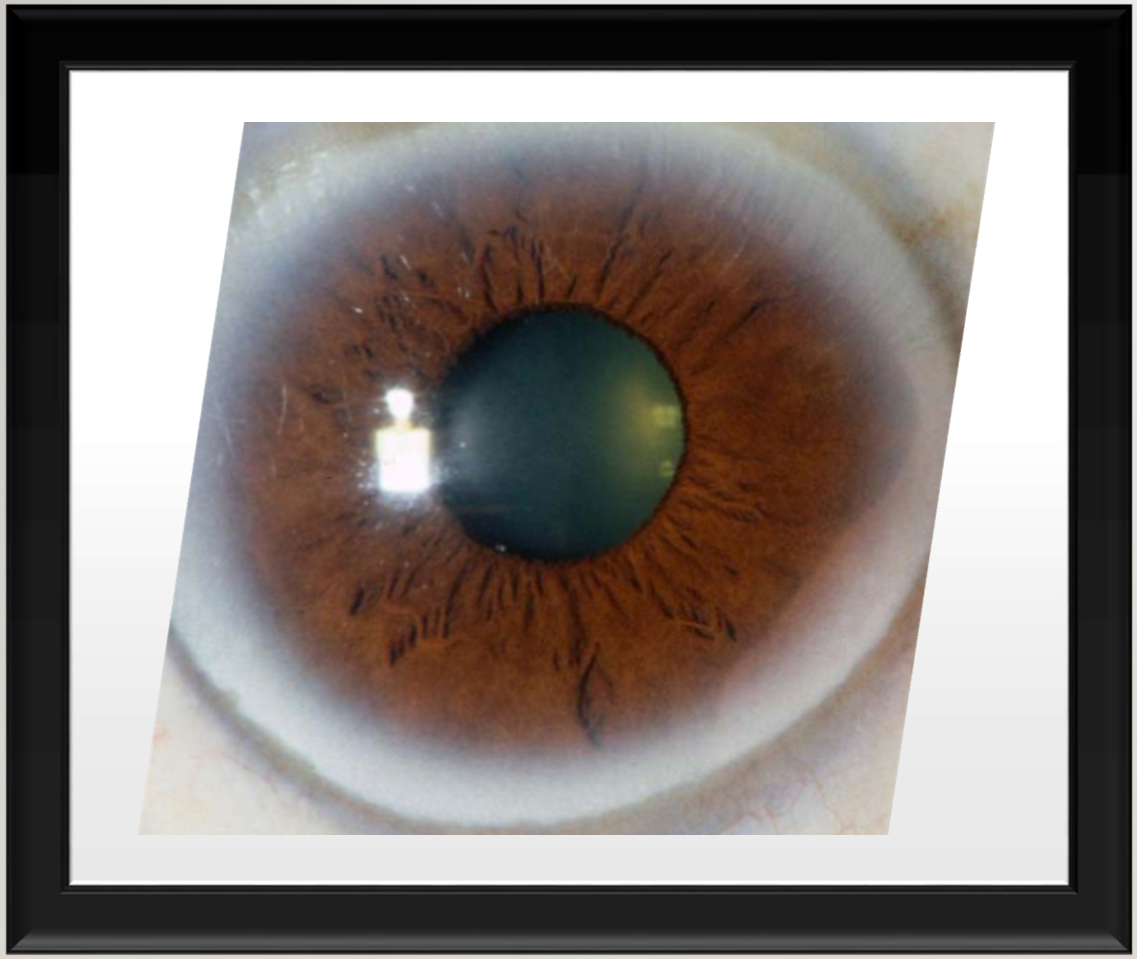
PENTACAM WINNING POINTS

- Market Leader
- Good Installment Base
- Good Clinical studies
- Good Marketing
- Considered the Golden standard of Anterior Chamber Imaging Based on Scheimpflug camera technology
- Connected to Alcon / WaveLight Exciemr Laser

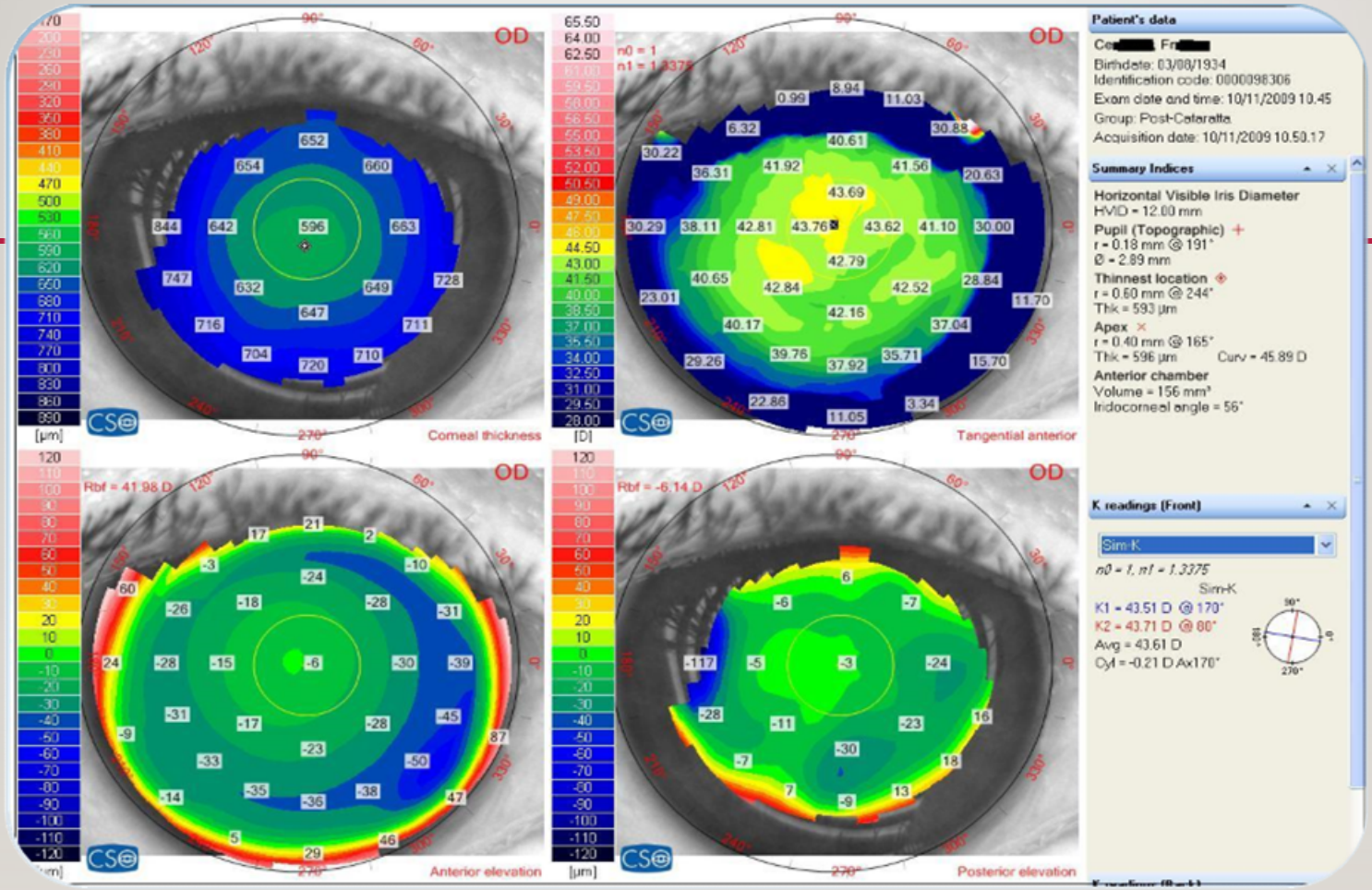
PENTACAM CONS

- Only Scheimpflug camera no Placido Disc





PENTACAM CONS


OD
Corneal thickness
Tangential anterior
Anterior elevation
Posterior elevation
Rbf = 41.98 D
Rbf = -6.14 D
[µm]
[D]
Patient's data
Birthdate: 03/08/1934
Identification code: 0000098306
Exam date and time: 10/11/2009 10.45
Group: Post-Cataratta
Acquisition date: 10/11/2009 10.50.17
Summary Indices
Horizontal Visible Iris Diameter
HVID = 12.00 mm
Pupil (Topographic)
r = 0.18 mm @ 191°
Ø = 2.89 mm
Thinnest location
r = 0.60 mm @ 244°
Thk = 593 µm
Apex
r = 0.40 mm @ 165°
Thk = 596 µm
Curv = 45.89 D
Anterior chamber
Volume = 156 mm³
Iridocorneal angle = 56°
K readings (Front)
Sim-K
n0 = 1, n1 = 1.3375
Sim-K
K1 = 43.51 D @ 170°
K2 = 43.71 D @ 80°
Avg = 43.61 D
Cyl = -0.21 D Ax170°

PENTACAM CONS

- Three Models no upgrades
- AXL very expensive
- Poor results of Biometry compared to Standard market instruments
- The machine is relatively cheep
- Pay for the software

MODULAR SOFTWARE

- General Overview
- Fast Screening Report
- Topography and Elevation Maps of the Anterior and Posterior Corneal Surface
- Pachymetry Maps, absolute and relative
- Scheimpflug Image Overview
- 3D Anterior chamber analysis
- Anterior segment tomography
- Topographical Keratoconus Classification (TKC)
- Belin ABCD Keratoconus Staging

MODULAR SOFTWARE

- Belin ABCD Progression Display
- Iris Image and HWTW
- 4 Maps Refractive
- Compare 2 Exams
- Belin/Ambrósio Enhanced Ectasia Display
- Contact Lens Fitting

REFRACTIVE PACKAGE

- Freely selectable reference bodies for elevation maps
- Corneal Optical Densitometry
- Corneal Rings
- Corneal analysis for refractive surgeons (corneal optical densitometry)
- Corneal thickness progression analysis for early keratoconus detection
- 4 Maps Selectable
- Show 2 Exams
- Compare 4 Exams
- Side-by-side comparison of topometric and pachymetric data
- Fourier Analysis

CATARACT PACKAGE

- Cataract Pre-OP Display for premium IOL selection and assessment of the optical properties of the entire cornea
- True Net Power map (TNP)
- Total Corneal Refractive Power map (TCRP)
- Corneal Power Distribution
- Zernike Analysis including normative corneal wavefront data
- PNS and 3D Cataract Analysis
- Show 2 Exams
- Measurements in the Scheimpflug images

CATARACT PACKAGE

- Automatic calculation of the anterior chamber angle in 360°, measurement based on Scheimpflug images
- 4 Maps Chamber
- Compare 4 Exams
- Comparative analysis of topometric and pachymetric data
- 4 Maps Topometric
- Anterior Chamber Depth Map
- 3D anterior chamber analysis
- Normative Corneal Wavefront data including anterior, posterior and total corneal data

CATARACT PACKAGE

- Compare 4 Exams
- Comparative analysis of topometric and pachymetric data
- Automatic calculation of the anterior chamber angle in 360°, measurement based on Scheimpflug images
- 4 Maps Chamber
- 4 Maps Topometric
- Anterior Chamber Depth Map
- Measurements in the Scheimpflug images
- 3D anterior chamber analysis
- Normative Corneal Wavefront data including anterior, posterior and total corneal data

COST

- Total Cost is 30% is higher than the Sirius

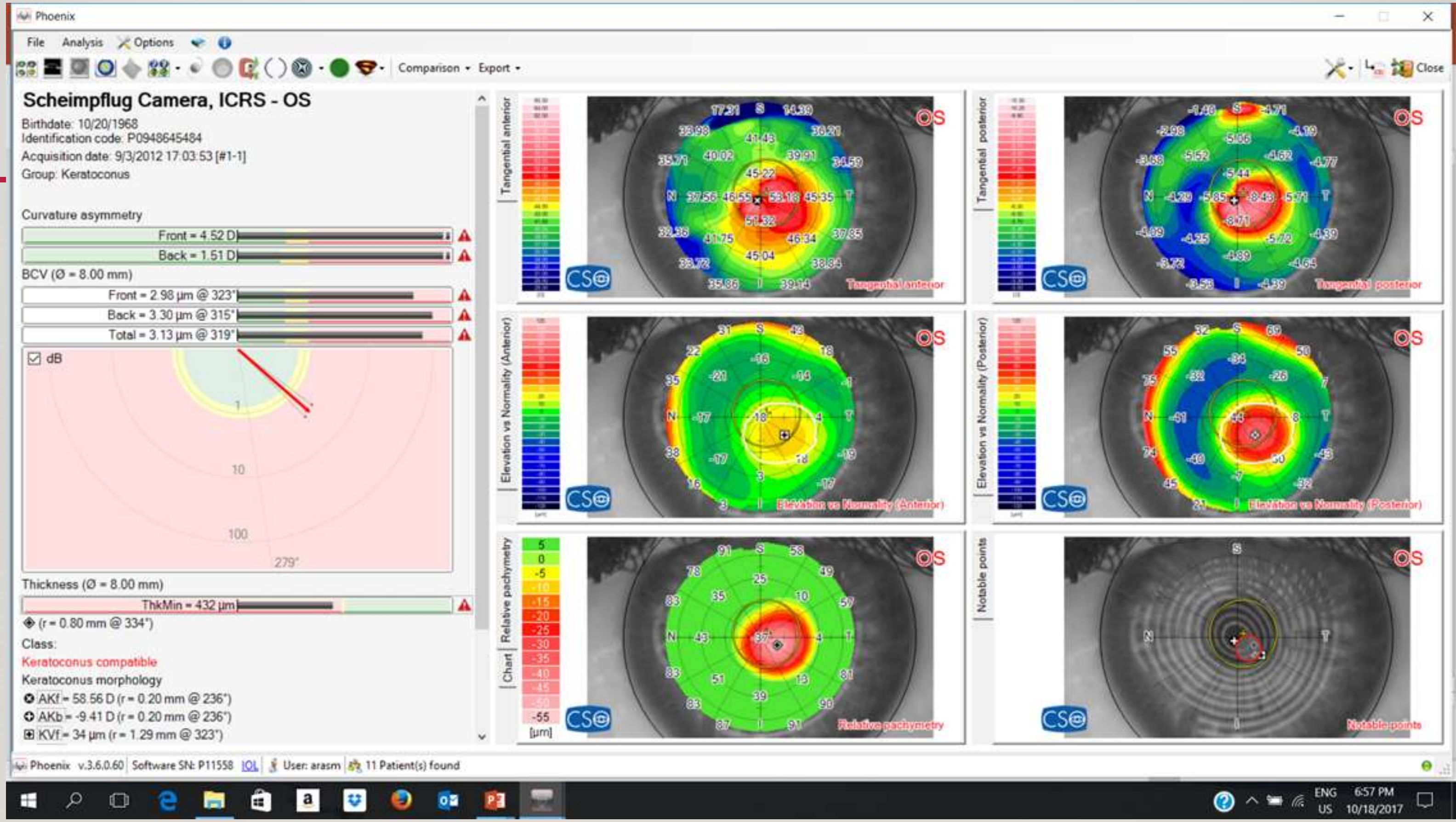
www.alamy.com - C06NA7

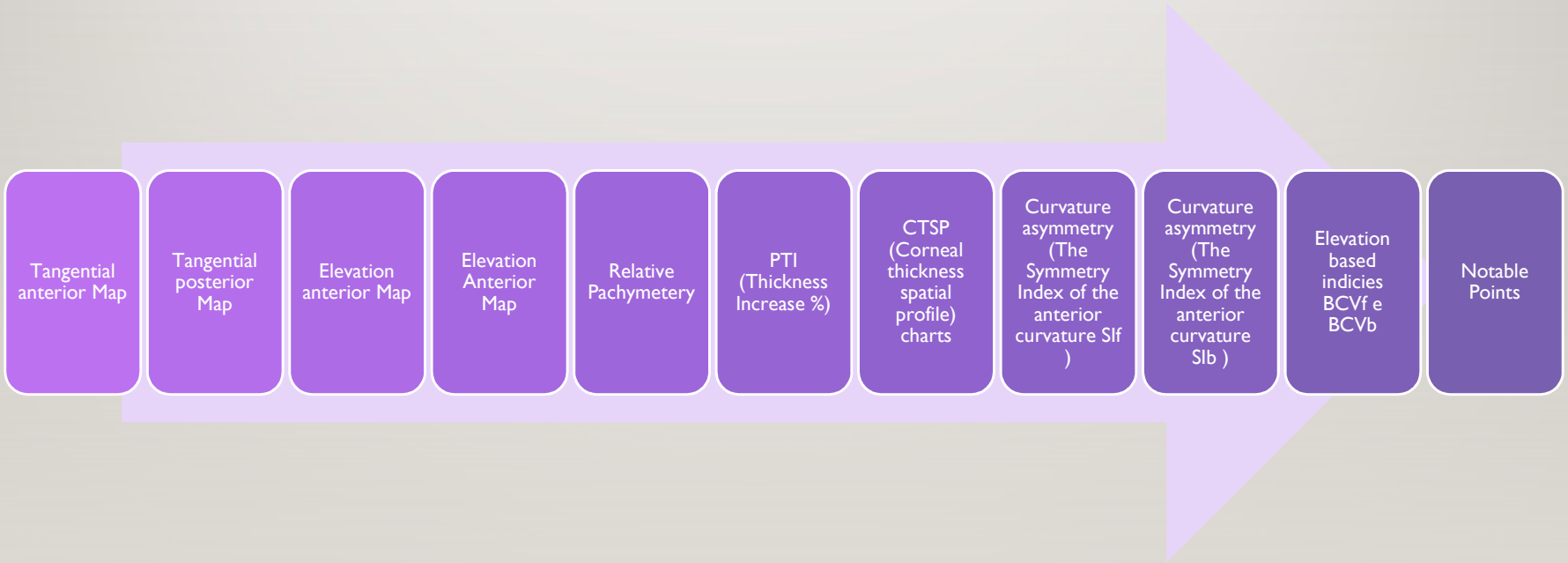
KERATOCONUS SCREENING

- Belin/Ambrósio Enhanced Ectasia Display
- Based on Anterior & Posterior Elevation and the Pachymetery

SIRIUS KERATOCONUS SCREENING

- Build on the Artificial Intelligence Concept
- The first study conducted with several thousands of Patients
- The System develope it self with thousands of cases
- Uses multiple factors and several maps to classify Keratoconus ;no only the posterior elevation and Pachymetery


Phoenix
File Analysis Options
Comparison Export
Close
Scheimpflug Camera, ICRS - OS
Birthdate: 10/20/1968
Identification code: P0948645484
Acquisition date: 9/3/2012 17:03:53 [#1-1]
Group: Keratoconus
Curvature asymmetry
Front = 4.52 D
Back = 1.51 D
BCV (Ø = 8.00 mm)
Front = 2.98 µm @ 323°
Back = 3.30 µm @ 315°
Total = 3.13 µm @ 319°
dB
279°
Thickness (Ø = 8.00 mm)
ThkMin = 432 µm
(r = 0.80 mm @ 334°)
Class:
Keratoconus compatible
Keratoconus morphology
AKf = 58.56 D (r = 0.20 mm @ 236°)
AKb = -9.41 D (r = 0.20 mm @ 236°)
KVf = 34 µm (r = 1.29 mm @ 323°)
Tangential anterior
Tangential posterior
Elevation vs Normality (Anterior)
Elevation vs Normality (Posterior)
Relative pachymetry
Notable points
Chart
OS
CSO
[µm]
Phoenix v.3.6.0.60 Software SN: P11558 IOL User: arasm 11 Patient(s) found
ENG US 6:57 PM 10/18/2017


Tangential anterior Map
Tangential posterior Map
Elevation anterior Map
Elevation Anterior Map
Relative Pachymetery
PTI (Thickness Increase %)
CTSP (Corneal thickness spatial profile) charts
Curvature asymmetry (The Symmetry Index of the anterior curvature SIf)
Curvature asymmetry (The Symmetry Index of the anterior curvature SIb)
Elevation based indicies BCVf e BCVb
Notable Points

IOL CALCULATION POST LASIK

Holladay Report and Holladay EKR65 Detail Report

Poor not accurate

Pentacam Keratometric Values Unreliable for IOL Power Calculation After Refractive Surgery

Pentacam Keratometric Values Unreliable for IOL Power Calculation After Refractive Surgery

To the Editor:

We read with interest the article by Gonen et al,[1] which appeared in the August 2012 issue of the *Journal of Refractive Surgery*, on their study comparing keratometric data from 200 patients evaluated for refractive surgery using four different devices—an automated keratometer (KR 8800 [Topcon, Tokyo, Japan]), two Placido-based computerized topography systems (Dicon CT 200 [Vismed Inc, San Diego, California] and Allegro Topolyzer [WaveLight Inc, Sterling, Virginia]), and a Scheimpflug analyzer (Pentacam [Oculus Optikgeräte GmbH, Wetzlar, Germany]). The study revealed that although the mean simulated keratometry (Sim K) obtained with the Pentacam did not differ significantly from the other three devices, the Pentacam gave rise to the greatest number of extreme outliers (>2.00-diopter [D] difference) on Bland-Altman plots. In addition, the 95% limits of agreement for the Pentacam Sim K value compared to the other devices was approximately 1.35 D

the mean absolute error (MAE) was 0.92±0.74 D, with 33% of eyes exhibiting an MAE of >1.00 D.

Other studies reflect these findings.[2-4] Interestingly, Kim et al[5] used Pentacam true net corneal power to calculate the IOL power for eyes requiring cataract surgery following keratorefractive surgery. Although postoperative refraction was ±0.50 D of intended in 70% of eyes (21/30), conversely, >25% of eyes had ⩾0.75 D MAE compared to the desired refractive outcome.

In a climate of refractive excellence, where surgeons target ±0.25 D of refractive error, the postoperative PRK and LASIK keratometric values provided by the Pentacam no longer appear acceptable in the calculation of IOL power. With increasing numbers of "baby-boomers" who have already undergone refractive surgery looking for equal excellence in cataract outcomes, surgeons must continue the search for accurate and reproducible keratometric values following corneal refractive surgery.

Jennifer C. Fan Gaskin, MBChB
Chi-Ying Chou, MBChB
Charles N.J. McGhee, PhD, FRCOphth
Auckland, New Zealand

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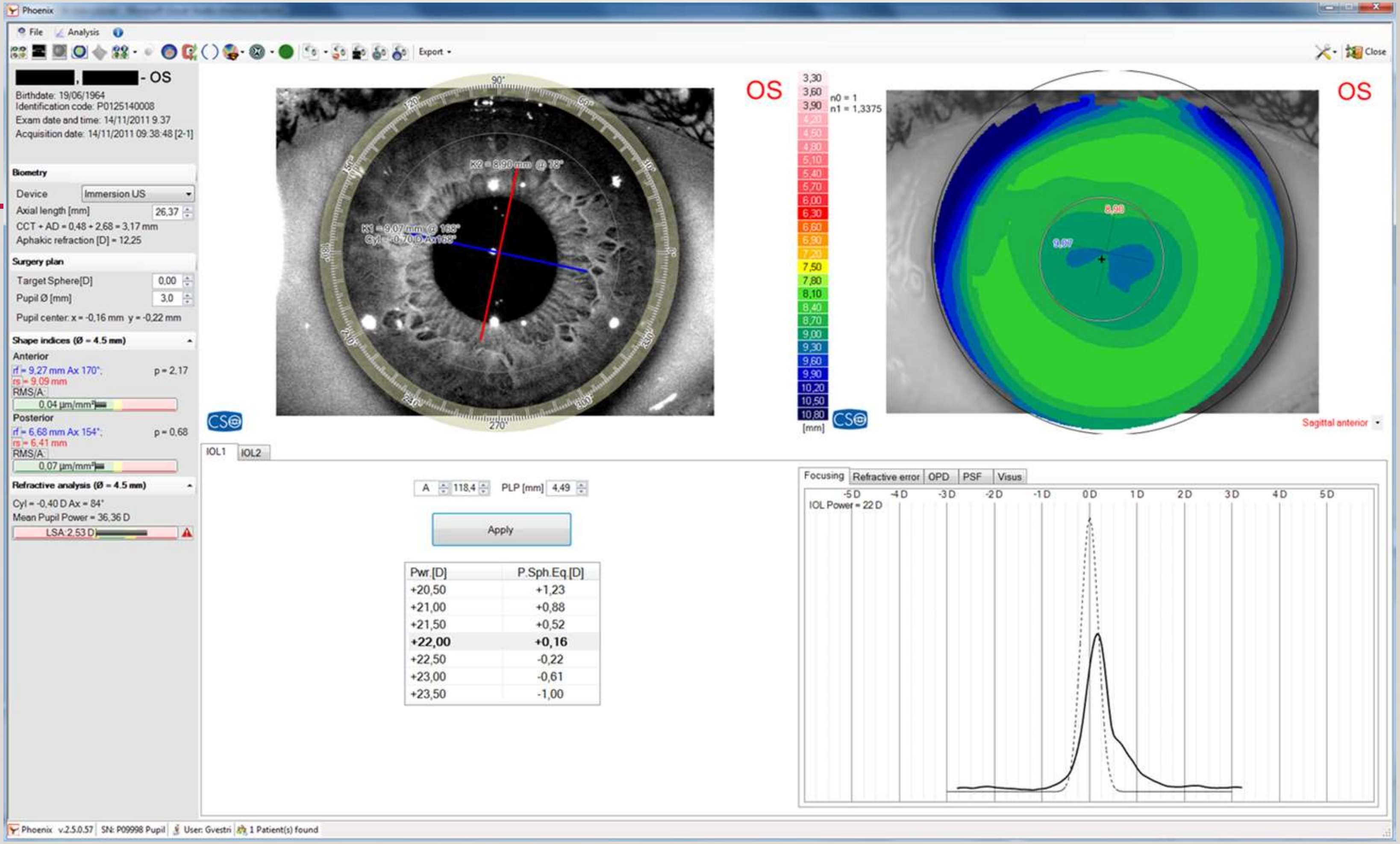
SIRIUS IOL CALCULATION

- Corneal ray tracing versus simulated keratometry for estimating corneal power changes after excimer laser surgery

METHODS: This multicenter retrospective study comprised patients who had myopic or hyperopic excimer laser refractive surgery. Preoperatively and postoperatively, 2 corneal power measurements—simulated keratometry (K) and mean pupil power—were obtained. The mean pupil power was the corneal power calculated over the entrance pupil by ray tracing through the anterior and posterior corneal surfaces using Snell's law. Agreement between the refractive and corneal power change was analyzed according to Bland and Altman. Regression analysis and Bland-Altman plots were used to evaluate agreement between measurements.

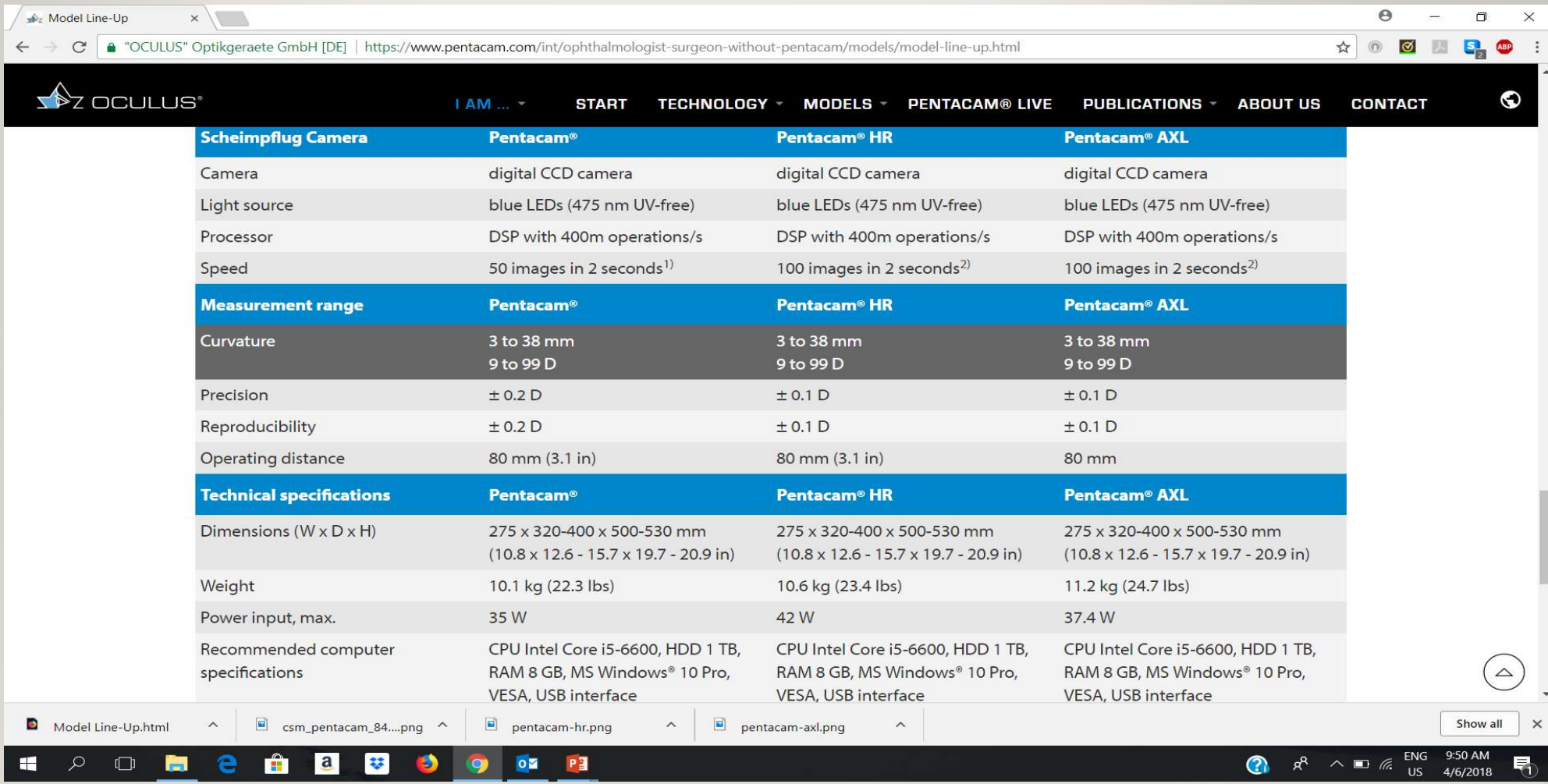
RESULTS: The study evaluated 72 eyes (54 patients). The difference between the postoperative and preoperative simulated K values underestimated the refractive change after myopic correction and overestimated it after hyperopic correction. Agreement between simulated K changes and refractive changes was poor, especially for higher amounts of correction. A proportional bias was detected ($r = -0.77$; $P<.0001$), and the 95% limits of agreement (LoA) were $-0.15 - 0.14 \times \pm 0.62$ diopters (D). The difference between the postoperative and preoperative mean pupil power showed an excellent correlation with the refractive change ($r^2 = 0.98$). The mean pupil power did not overestimate or underestimate the refractive change. The 95% LoA ranged between -0.97 D and $+0.56$ D.

CONCLUSION: Corneal ray tracing accurately measured corneal power changes after excimer laser refractive surgery.


Phoenix
File Analysis
Export
Close
[redacted] - OS
Birthdate: 19/06/1964
Identification code: P0125140008
Exam date and time: 14/11/2011 9.37
Acquisition date: 14/11/2011 09:38:48 [2-1]
Biometry
Device Immersion US
Axial length [mm] 26,37
CCT + AD = 0,48 + 2,68 = 3,17 mm
Aphakic refraction [D] = 12,25
Surgery plan
Target Sphere[D] 0,00
Pupil Ø [mm] 3,0
Pupil center: x = -0,16 mm y = -0,22 mm
Shape indices (Ø = 4.5 mm)
Anterior
rf = 9,27 mm Ax 170°; p = 2,17
rs = 9,09 mm
RMS/A:
0,04 μm/mm²
Posterior
rf = 6,68 mm Ax 154°; p = 0,68
rs = 6,41 mm
RMS/A:
0,07 μm/mm²
Refractive analysis (Ø = 4.5 mm)
Cyl = -0,40 D Ax = 84°
Mean Pupil Power = 36,36 D
LSA 2,53 D
OS
OS
n0 = 1
n1 = 1,3375
Sagittal anterior
IOL1
IOL2
A 118,4 PLP [mm] 4,49
Apply
Pwr.[D] P.Sph.Eq.[D]
+20,50 +1,23
+21,00 +0,88
+21,50 +0,52
+22,00 +0,16
+22,50 -0,22
+23,00 -0,61
+23,50 -1,00
Focusing Refractive error OPD PSF Visus
IOL Power = 22 D
-5 D -4 D -3 D -2 D -1 D 0 D 1 D 2 D 3 D 4 D 5 D
Phoenix v.2.5.0.57 SN: P09998 Pupil User: Gvestri 1 Patient(s) found

WHAT SIRIUS DOES NOT HAVE

- Biometry
- Fourier Analysis
- PNS & 3D cataract Analysis
- 3D pIOL Simulation and Aging Prediction



Scheimpflug Camera	Pentacam®	Pentacam® HR	Pentacam® AXL
Camera	digital CCD camera	digital CCD camera	digital CCD camera
Light source	blue LEDs (475 nm UV-free)	blue LEDs (475 nm UV-free)	blue LEDs (475 nm UV-free)
Processor	DSP with 400m operations/s	DSP with 400m operations/s	DSP with 400m operations/s
Speed	50 images in 2 seconds[1)]	100 images in 2 seconds[2)]	100 images in 2 seconds[2)]
Measurement range	**Pentacam®**	**Pentacam® HR**	**Pentacam® AXL**
Curvature	3 to 38 mm 9 to 99 D	3 to 38 mm 9 to 99 D	3 to 38 mm 9 to 99 D
Precision	± 0.2 D	± 0.1 D	± 0.1 D
Reproducibility	± 0.2 D	± 0.1 D	± 0.1 D
Operating distance	80 mm (3.1 in)	80 mm (3.1 in)	80 mm
Technical specifications	**Pentacam®**	**Pentacam® HR**	**Pentacam® AXL**
Dimensions (W x D x H)	275 x 320-400 x 500-530 mm (10.8 x 12.6 - 15.7 x 19.7 - 20.9 in)	275 x 320-400 x 500-530 mm (10.8 x 12.6 - 15.7 x 19.7 - 20.9 in)	275 x 320-400 x 500-530 mm (10.8 x 12.6 - 15.7 x 19.7 - 20.9 in)
Weight	10.1 kg (22.3 lbs)	10.6 kg (23.4 lbs)	11.2 kg (24.7 lbs)
Power input, max.	35 W	42 W	37.4 W
Recommended computer specifications	CPU Intel Core i5-6600, HDD 1 TB, RAM 8 GB, MS Windows® 10 Pro, VESA, USB interface	CPU Intel Core i5-6600, HDD 1 TB, RAM 8 GB, MS Windows® 10 Pro, VESA, USB interface	CPU Intel Core i5-6600, HDD 1 TB, RAM 8 GB, MS Windows® 10 Pro, VESA, USB interface

PENTACAM WHAT DOES NOT HAVE

- Simulation quality of vision
- pupillometry
- Tear film analysis
- meibografy
- Integration with other instruments like Wavefront analyzer and SL
- Advanced Alemtric
- Front Gaussian
- Advanced Pachymetery

GALILEI

FOR REFRACTIVE AND CATARACT SURGERY

GALILEI G4

REACHING A NEW LEVEL IN CORNEAL TOPOGRAPHY AND TOMOGRAPHY

GALILEI

THE NEW GALILEI G6

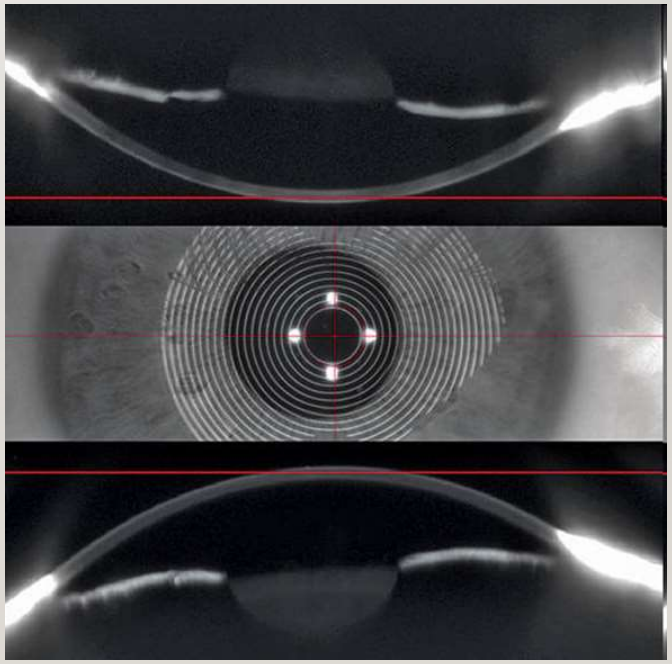
REACHING A NEW LEVEL IN
BIOMETRY WITH HD TOPOGRAPHY
AND TOMOGRAPHY

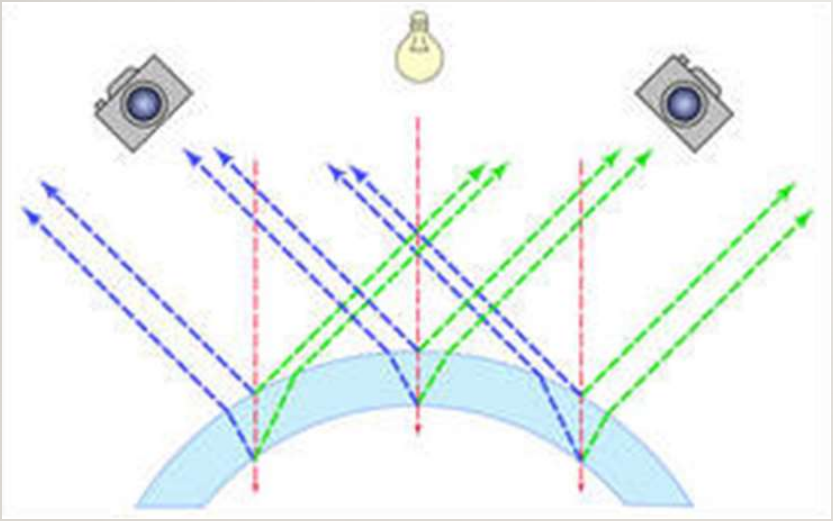
„THE MOST COMPLETE ALL-IN-ONE SOLUTION, FROM REFRACTIVE TO CATARACT SURGERY“

The GALILEI G6 Lens Professional is pending FDA approval and is not available for sale in the US. For some other countries, availability may be restricted due to local regulatory requirements. Please contact Ziemer for details.

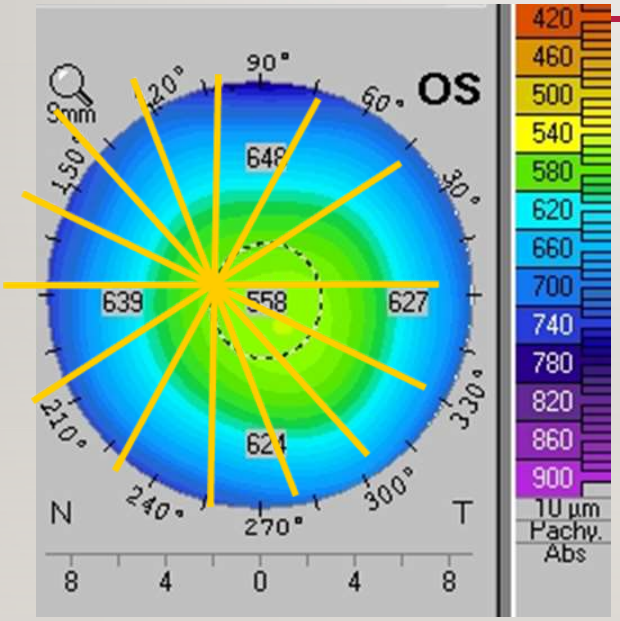
GALILEI

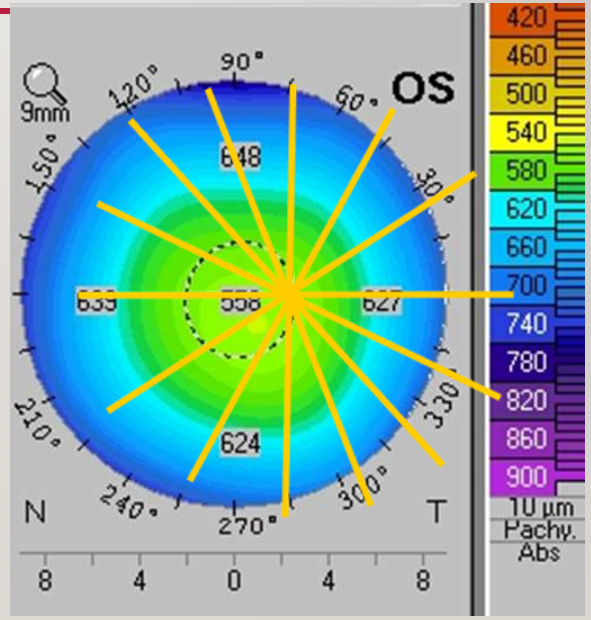
- Placido Disk
- Dual Scheimpflug camera





DUAL CAMERA


OS
9mm
90°
120°
60°
150°
30°
180°
0°
210°
330°
240°
300°
270°
648
639
558
627
624
N
T
8
4
0
4
8
420
460
500
540
580
620
660
700
740
780
820
860
900
10 µm
Pachy.
Abs


OS
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580
620
660
700
740
780
820
860
900
10 µm
Pachy.
Abs

GALILEI CONS

- Not easy to install , needs certified engineer to installed
- Normally you will end with broken fiber optic
- Adding dual camera means to many mechanical parts , slow, noisy , and the whole system moves when you start measuring
- Screening monitor , more connections and more problems , not easy to replce needs to be send to the factory

GALILEI CONS

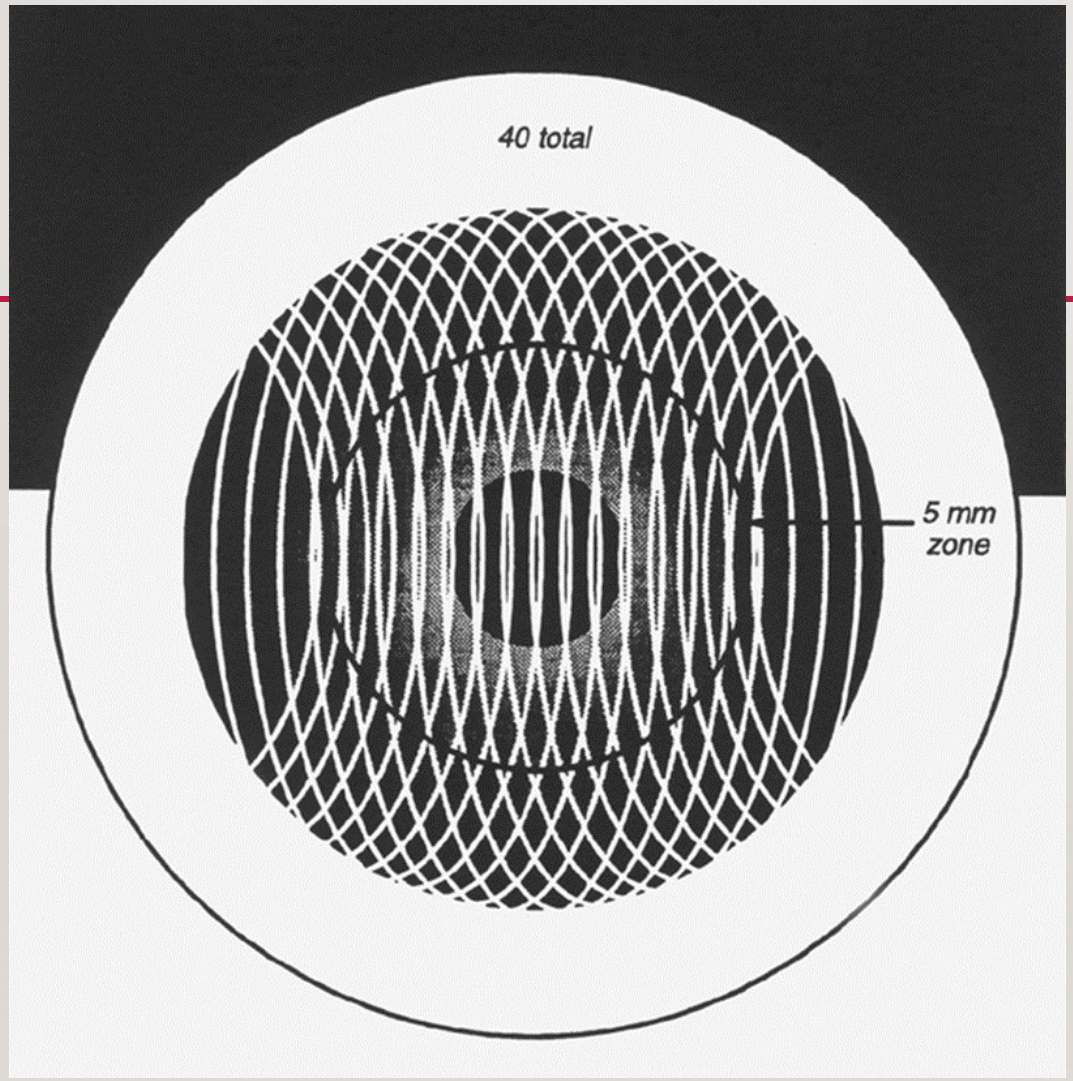
- Not very sold in the market no large instalments
- Software not modular , but the it is poor only the basic functions
- IOL Calculation Poor

FEATURES DOES NOT HAVE

- Simulation quality of vision
- pupillometry
- Tear film analysis
- meibografy
- Integration with other instruments like Wavefront analyzer and SL
- Advanced Alemtric
- Front Gaussian
- Advanced Pachymetery

ORBISCAN

- Not Scheimpflug camera
- Scanning slit
- each single Slit Image from limbus to limbus, but overlay of the slit images only in the central 5mm zone, 2D-information, add. Placido system
- 40 slit images, each one with 300-350 data points, sum: 12.000 – 14.000 data points


40 total
5 mm
zone

DISADVANTAGES OF THE OBRISCAN

- Long examination time
- Old technology , over 20 years old
- Not reliable Pachymetery
- You have to optimize the Pachymetery with the factor
- No IOL calculation
- No Online support , hard to make service

TOMEY TMS-5

- Small foot print
- Higher speed
- 64scan in 1 sec

TMS-5 CONS

- Using small Placido disc ,theoretically should be cover more of the cornea , but you have to be so close to the eye of the Patient and it s very uncomfortable
- Take picture for the Placido then the camera should turn and position the Scheimpflug ,

Too much mechanics and lose the centration

- Built in PC , if you have any problem of the PC the system will not work
- Connectivity
- Non Online Support

Thank You