ALADDIN®
CLINICAL COMPENDIUM

Summary of peer-reviewed clinical research

TOPCON Healthcare

PREFACE

The Aladdin biometer by Visia Imaging S.r.l. (San Giovanni Valderno, Italy) is a multimodal device that combines optical biometry, corneal topography and wavefront analysis of the cornea in a single platform. This clinical compendium provides a view of peer-reviewed publications.

It is practical, evidence-based overview of published clinical data designed to support understanding, communication, and adoption of the Topcon Aladdin optical biometer and its clinical applications. This document is not, in any way, a user manual. It is also not intended for such use; its purpose is solely to present the outcomes of completed studies related to selected Topcon products.

In addition to exploring this clinical compendium, we encourage you to learn more about our portfolio and dedication to research and science at www.topconhealthcare.eu.

NOTE: Not all products, services or offers are approved or offered in every market, and products vary from one country to another. Contact your local distributor for country-specific information.

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Savini G, Abbate R, Hoffer K, Mularoni A, Imburgia A, Avoni L, D'Eliseo D, Schiano-Lomoriello D. Journal of Cataract & Refractive Eye Surgery. 2022; 48(8):947-953. doi:10.1097/j.jcrs.0000000000000902

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Savini G, Lupardi E, Hoffer KJ, Aramberri J, Schiano-Lomoriello D Journal of Cataract and Refractive Surgery. 2022 Nov;48(11):1292–6. doi:10.1097/j.jcrs.0000000000000976

30 CONGRESS PRESENTATIONS AND POSTERS

PEER-REVIEWED PUBLICATIONS

Validity and repeatability of the Aladdin ocular biometer

AUTHORS: Mandal P, Berrow EJ, Naroo SA, Wolffsohn JS, Uthoff D, Holland D, Shah S.

PUBLICATION: Br J Ophthalmol. 2014 Feb;98(2):256-8. doi: 10.1136/bjophthalmol-2013-304002. Epub 2013 Nov 13.
Erratum in: Br J Ophthalmol. 2015 Dec;99(12):1746. doi: 10.1136/bjophthalmol-2013-304002corr1

STUDY PURPOSE

To evaluate the validity and interobserver reproducibility of ocular measurements undertaken with the Aladdin biometer in comparison with the IOLMaster® 500.

OVERVIEW

STUDY DESIGN

Prospective observational study

STUDY DEVICE(S)

- Aladdin (Visia Imaging S.r.l., Italy)
- IOLMaster® 500 (Carl Zeiss Meditec, Berlin, Germany)

OF EYES/SUBJECTS

- 75 subjects with cataract (mean age 74.9 ± 8.5 years, 61% women) and 22 young healthy participants (mean age 36.6 ± 13.3 years, 64% women)
- Aladdin measurements were also subsequently repeated by another examiner in a subset of 22 subjects after 5–10 min to assess interobserver variation

OUTCOME MEASURES

- Difference in measurements of axial length (AL), anterior chamber depth (ACD) and keratometry (K)
- Interobserver variability for each parameter

RESULTS

- All measurements with the Aladdin were achieved within the 5 seconds stated by the manufacturer.
- The average AL was 23.65 ±1.36 mm with the Aladdin and 23.64±1.36 mm with the IOLMaster® 500 with no statistical significance between them (p=0.0695). The mean difference was 0.01 mm with a 95% CI of 0.06 mm (**Figure 1**).
- The average keratometry reading was 43.80±1.47 D with the Aladdin and 43.84±1.41 D with the IOLMaster®, with no statistical significance between them (p=0.354). The mean difference was −0.08 D with a 95% CI of 0.51 D (figure 3). Interobserver repeatability was 0.01 D with a 95% CI of 0.17 D (weighted κ=0.886). All subjects could be measured with both biometers.

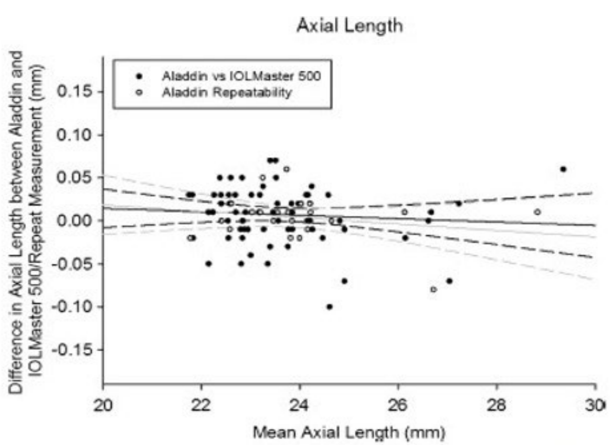

Figure 1 Bland-Altman plot showing the difference in the axial length (AL) with the Aladdin compared with the IOLMaster® 500 (n=75, black circles) and repeat Aladdin (n=22, white circles) measurement versus the mean measurement of AL. The solid line represents the mean difference in measurement. The dotted lines represent the upper and lower 95% limits of agreement.

Adapted from Br J Ophthalmol. 2014 Feb;98(2):256-8.

CONCLUSIONS

- There was not found to be a statistically significant difference between calculations of IOL powers between the two biometers, demonstrating that the Aladdin is able to produce clinically reliable results comparable with that of the IOLMaster®.
- The Aladdin was able to perform biometry measurements on a higher proportion of cataracts than the IOLMaster®, with only two IOL power predictions failing to be calculated by the Aladdin compared with six by the IOLMaster® 500.
- Optical biometry performed with the Aladdin instrument was generally fast, easy, and convenient to undertake, and appeared to more easily penetrate dense cataracts and produce biometric results to calculate the required IOL power.

Comparison of different formulas for intraocular lens power calculation using a new optical biometer

AUTHORS: Kaya F, Kocak I, Aydin A, Baybora H, Karabela Y.

PUBLICATION: Ophtalmologie. 2015;38(8):717-722. doi:10.1016/j.jfo.2015.03.006.

STUDY PURPOSE

To evaluate and compare the predictability of different formulas for intraocular lens (IOL) power calculation using the Aladdin optical biometer.

OVERVIEW

STUDY DESIGN

Prospective, cross-sectional study

STUDY DEVICE(S)

- Aladdin (Visia Imaging S.r.l., Italy)

OF EYES/SUBJECTS

70 eyes of 70 subjects undergoing uneventful phacoemulsification with IOL implantation

OUTCOME MEASURES

- Estimation Error (EE) = Difference between actual and predicted refractive error
- Absolute Estimation Error (AEE)
- Percentage of eyes within ±0.50 D and ±1.00 D of target refraction

Subjects were grouped by axial length (AL):
Group 1: AL < 22.5 mm
Group 2: 22.5–24 mm
Group 3: > 24 mm

RESULTS

- In overall study group, the smallest mean AEE was obtained by using Holladay 1 formula (0.39 D ± 0.32), however there was no statistically significant difference in the mean AEEs predicted by the five formulas (P = 0.34).
- In group 1 (n = 13), mean AL was 22.02 ± 0.60 mm (range, 20.69—22.48 mm). The smallest mean AEE was calculated by using SRK/T (0.50 D ± 0.46) comparing with other four formulas, however the difference was not statistically significant (P = 0.68).
- In group 2 (n = 41), mean AL was 23.24 ± 0.37 mm (range, 22.67—23.95 mm). The smallest mean AEE was obtained by using Holladay 1 (0.38 ± 0.27). However, no significant difference of mean AEE was found between five formulas (P = 0.27).
- In group 3 (n = 16) mean AL was 24.77 ± 0.89 mm (range, 24.01—26.59 mm. Although there was no significant difference of mean AEE between five formulas (P = 0.13), the smallest mean AEE was calculated by using SRK/T (0.28 D ± 0.19).
- The highest percentage of eyes within ±0.50 and ±1.00 D of target refraction was also found by using SRK/T (87% and 100%).

Table 1 Characteristics of patients and preoperative measurements.

Parameter	Mean ± SD	Range
Age, years	68.4 ± 11.6	26–95
Sex, n (%)		–
Male	23 (32%)	
Female	47 (47%)	
Laterality, n (%)		–
Right eye	33 (47%)	
Left eye	37 (53%)	
K value, D	43.66 ± 1.63	40.16–46.64
Corneal astigmatism, D	−0.73 ± 0.65	0–(−1.88)
ACD, mm	3.14 ± 0.39	2.42–4.57
Axial length, mm	23.3 ± 1.06	20.69–26.59
IOL power, D	21.7 ± 2.96	9–28.5

SD: standard deviation; K: mean corneal power; D: diopters; IOL: intraocular lens; ACD: anterior chamber depth.

Adapted from Journal Francais d'Ophtalmologie. 2015;38(8):717-722.

CONCLUSIONS

- The Aladdin optical biometer produces satisfactory refractive results. Although the difference of mean AEE between five formulas was not statistically significant, Holladay 1 formula can be preferred in eyes with moderate AL. Better results can be obtained using SRK/T formula in eyes with short or long AL.

Repeatability and reproducibility of ocular biometry using a new noncontact optical low-coherence interferometer

AUTHORS: Huang J, Savini G, Wu F, Yu X, Yang J, Yu A, Yu Y, Wang Q.

PUBLICATION: J Cataract Refract Surg. 2015 Oct;41(10):2233-41. doi: 10.1016/j.jcrs.2015.10.062

STUDY PURPOSE

To evaluate both the intraoperator repeatability and interoperator reproducibility of the Aladdin measurements in healthy subjects and in subjects with cataracts.

OVERVIEW

STUDY DESIGN

Observational cross-sectional study

STUDY DEVICE(S)

- Aladdin (Visia Imaging S.r.l., Italy)

OF EYES/SUBJECTS

The right eye of ninety-eight subjects, of which 52 eyes were from healthy subjects and 46 eyes were from subjects with cataracts

OUTCOME MEASURES

Intraoperator repeatability and interoperator reproducibility of axial length (AL), anterior chamber depth (ACD), keratometry (K), and white-to white (WTW) measurements

RESULTS

- Measurement of the AL provided the highest repeatability as the test–retest repeatability was lower than 0.06 mm and the ICC between 0.999 and 1.0.
- In the cataract group measurements of the AL, ACD, and K values with the new biometer showed high intraoperator repeatability with both operators. The ICC was higher than 0.98. In contrast to the healthy group, a lower repeatability was detected for WTW measurements; the ICC was about 0.8 and the test–retest repeatability values were 0.66 and 0.8 mm for the 2 operators.
- In the healthy group there was no statistically significant difference between the 2 operators' measurements (P > .05), and the interoperator reproducibility was excellent for all parameters. Bland-Altman plots showed narrow 95% LoA for the AL, ACD, K values, and WTW measurements, and a fixed bias was not detected between the 2 operators.

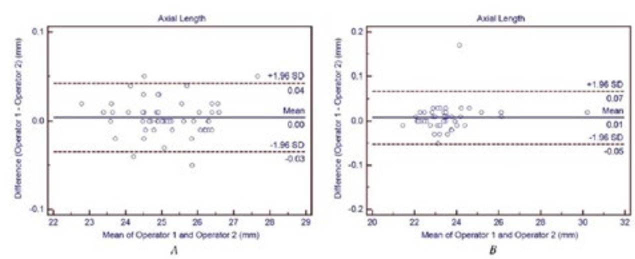

Figure 1. Bland-Altman plots showing agreement in AL measurements between 2 operators in healthy group (A) and subjects in cataract group (B). The solid line indicates the mean difference (bias). The upper and lower dashed lines represent the 95% LoA.

Adapted from J Cataract Refract Surg. 2015 Oct;41(10):2233-41.

- In the cataract group, there was no statistically significant difference between the 2 operators' measurements. The interoperator reproducibility was high with both operators for all measurements except for WTW. Bland-Altman plots showed narrow 95% LoA for the AL, ACD, and K values and wider 95% LoA for WTW. However, a fixed bias was not detected in WTW measurements between the 2 operators.
- The 95% LoA of AL, ACD, flat K, steep K, and mean K measurements were slightly narrower in the healthy group than in the cataract group. However, eyes with cataract produced wider 95% LoA for WTW measurements than healthy eyes.

CONCLUSIONS

- The new noncontact OLCI device Aladdin showed excellent intraoperator repeatability and interoperator reproducibility for all measurements except WTW in eyes with cataract. This suggests that the Aladdin can be used for routine clinical practice to acquire AL, ACD, and K vales for IOL power calculation.

Multicenter study of optical low-coherence interferometry and partial-coherence interferometry optical biometers with patients from the United States and China

AUTHORS: Hoffer KJ, Shammas HJ, Savini G, Huang J.

PUBLICATION: J Cataract Refract Surg. 2016 Jan;42(1):62-7. doi: 10.1016/j.jcrs.2015.07.041

STUDY PURPOSE

To evaluate the agreement between the measurements provided by a new optical biometer, the Aladdin, based on optical low-coherence interferometry (OLCI), and those provided by the most commonly used optical biometer (IOLMaster® 500), based on partial-coherence interferometry (PCI).

OVERVIEW

STUDY DESIGN

Multicentre prospective observational study

STUDY DEVICE(S)

- Aladdin (Visia Imaging S.r.l., Italy)
- IOLMaster® 500 (Carl Zeiss Meditec)

OF EYES/SUBJECTS

- 2 samples of adult subjects were enrolled: United States group included subjects scheduled for cataract surgery and China group included a sample of healthy subjects with no cataract. There was a sample size of 14 eyes per group.

OUTCOME MEASURES

Axial length (AL), corneal power (in dioptres [D]) (K), anterior chamber depth (ACD) (corneal epithelium to lens), and corneal astigmatism

RESULTS

- In the US and China groups, the OLCI mean AL values did not show a statistically significant difference from PCI values and showed excellent agreement and correlation.
- OLCI measured a lower mean K (-0.14 D) and a deeper ACD measurements (US+0.16 mm and China+0.05 mm).
- These differences were statistically significant (P < .0001). Vector analysis did not show a statistically significant difference in astigmatism measurements.

Table 3. Mean of AL, K, ACD, and astigmatism as measured by OLCI and PCI in the China group.

	Mean ± SD					
	OCLR	PCI	Diff	P Value*	95% LoA	CC r (P Value)
AL (mm)	25.13 ± 1.02	25.13 ± 1.03	−0.01	.062†	−0.06, 0.05	1.000 (<.0001)
K flat (D)	43.12 ± 1.50	43.25 ± 1.56	−0.13	<.0001	−0.40, 0.14	0.997 (<.0001)
K steep (D)	44.09 ± 1.73	44.24 ± 1.77	−0.14	<.0001	−0.52, 0.23	0.994 (<.0001)
K ave (D)	43.61 ± 1.60	43.74 ± 1.64	−0.14	<.0001	−0.37, 0.10	0.998 (<.0001)
ACD (mm)	3.72 ± 0.25	3.67 ± 0.27	+0.05	<.0001	−0.07, 0.17	0.975 (<.0001)
J0	−0.02 ± 0.02	−0.02 ± 0.02	0.00	.3315†	−0.02, 0.02	0.917 (<.0001)
J45	−0.49 ± 0.26	−0.49 ± 0.29	0.01	.6949†	−0.23, 0.24	0.914 (<.0001)

AL = axial length; ACD = anterior chamber depth; CC = correlation coefficient; Diff = difference; J0 = Jackson cross-cylinder, axes at 180 degrees and 90 degrees; J45 = Jackson cross-cylinder, axes at 45 degrees and 135 degrees; K = keratometry; LoA = limits of agreement; OLCI = optical low-coherence interferometry; PCI = partial-coherence interferometry
*Paired t test
†Not statistically significant

Adapted from J Cataract Refract Surg. 2016;42(1):62-7.

Table 1. Mean AL, K, ACD, and astigmatism measured by OLCI and PCI in the U.S. group.

	Mean ± SD					
Parameter	OLCI	PCI	Diff	P Value*	95% LoA	CC r (P Value)
AL (mm)	23.59 ± 0.99	23.58 ± 1.00	+0.01	.0770†	−0.09, +0.12	0.9986 (<.0001)
K flat (D)	43.33 ± 1.71	43.38 ± 1.71	−0.06	.0637	−0.53, +0.41	0.990 (<.0001)
K steep (D)	44.22 ± 1.68	44.41 ± 1.70	−0.20	<.0001	−0.70, + 0.31	0.9886 (<.0001)
Mean K (D)	43.77 ± 1.67	43.90 ± 1.67	−0.14	<.0001	−0.47, +0.22	0.9944 (<.0001)
ACD (mm)	3.13 ± 0.43	2.95 ± 0.44	+0.16	.0001	−0.42, +0.78	0.7512 (<.0001)
J0	−0.04 ± 0.46	−0.01 ± 0.57	−0.02	.2918†	−0.45, +0.39	0.9160 (<.0001)
J45	0.00 ± 0.28	0.02 ± 0.31	−0.02	0.3796†	−0.30, +0.26	0.8911 (<.0001)

AL = axial length; ACD = anterior chamber depth; CC = correlation coefficient; Diff = difference; J0 = Jackson cross-cylinder, axes at 180 degrees and 90 degrees; J45 = Jackson cross-cylinder, axes at 45 degrees and 135 degrees; K = keratometry; LoA = limits of agreement; OLCI = optical low-coherence interferometry; PCI = partial-coherence interferometry
*Paired t test
†Not statistically significant

Adapted from J Cataract Refract Surg. 2016;42(1):62-7.

CONCLUSIONS

- Agreement between OLCI and PCI was good. However, the small but statistically significant differences in K and ACD measurements make constant optimisation necessary when calculating the intraocular lens power using theoretical formulas.

Comparative analysis of optical biometers

AUTHORS: Sabatino F, Findl O, Maurino V.

PUBLICATION: Journal of Cataract and Refractive Surgery. 2016 May;42(5):685–93. doi:10.1016/j.jcrs.2016.01.051

STUDY PURPOSE

To evaluate the level of agreement, consistency, variation, repeatability, and correlation of the IOLMaster® 500 PCI biometer and Aladdin OLCI biometer for measurements of AL, mean K, ACD, and corneal diameter in a large cohort of subjects.

OVERVIEW

STUDY DESIGN

Prospective comparative case series

STUDY DEVICE(S)

- Aladdin (Visia Imaging S.r.l., Italy)
- IOLMaster® (Carl Zeiss Meditec AG)

OF EYES/SUBJECTS

215 eyes; the interclass correlation coefficient (ICC) for the mean K and ACD was calculated in a subset of 54 eyes (for which the OLCI biometry had been repeated)

OUTCOME MEASURES

- Primary: Measurements of axial length (AL), anterior chamber depth (ACD), mean keratometry (mean K), and corneal diameter
- Secondary: intraoperator repeatability of both biometers relating to AL, mean K, and ACD

RESULTS

Table 1. Biometric variables, coefficient of variation, and statistical differences between data acquired with the 2 biometers.

Parameter/ Biometer	Both Eyes: Central Tendency & Statistical Dispersion	Both Eyes: Range	Both Eyes: CoV (%)	Both Eyes: P Value	Right Eyes: Central Tendency & Statistical Dispersion	Right Eyes: Range	Right Eyes: CoV (%)	Right Eyes: P Value	Left Eyes: Central Tendency & Statistical Dispersion	Left Eyes: Range	Left Eyes: CoV (%)	Left Eyes: P Value
Axial length				.004‡				.048‡				.043‡
PCI	23.67 (1.48)*	22.05, 28.31	2.75		23.68 (1.48)*	22.15, 28.26	2.66		23.67 (1.38)*	22.05, 28.31	2.89	
OLCI	23.71 (1.48)*	22.09, 28.25	2.70		23.69 (1.44)*	22.15, 28.22	2.55		23.71 (1.38)*	22.09, 28.25	2.81	
K mean				.000‡				.000‡				.000§
PCI	43.48 (2.57)*	37.25, 47.13	2.96		43.41 (2.63)*	37.25, 46.97	2.99		43.64 (1.65)†	39.52, 47.13	2.91	
OLCI	43.32 (2.55)*	37.52, 47.13	3.00		43.30 (2.67)*	37.52, 46.76	3.01		43.56 (1.63)†	39.52, 47.02	2.79	
ACD				.017§				.060§				.140§
PCI	3.13 (0.36)†	2.16, 4.26‡	11.6		3.12 (0.39)*	2.16, 4.26	12.4		3.14 (0.34)†	2.36, 3.87	10.8	
OLCI	3.16 (0.30)†	2.38, 4.10‡	9.3		3.16 (0.31)†	2.38, 4.10	9.9		3.17 (0.28)†	2.58, 4.00	8.8	
Corneal diameter				.000§				.000§				.000§
PCI	12.08 (0.38)†	10.91, 13.00‡	3.1		12.08 (0.37)†	11.00, 12.90	3.0		12.07 (0.40)†	10.91, 13.00	3.3	
OLCI	11.69 (0.40)†	10.51, 12.77	3.4		11.68 (0.40)†	10.81, 12.77	3.4		11.69 (0.39)†	10.51, 12.51	3.4	

ACD = anterior chamber depth; CoV = coefficient of variation; K = keratometric; OLCI = optical low-coherence interferometry; PCI = partial coherence interferometry
*Median (interquartile range)
†Mean (SD)
‡Wilcoxon signed-rank test
§Student *t* test for paired samples

Adapted from J Cataract Refract Surg. 2016;42(5):685-93.

Table 2. Correlation coefficients between the 2 biometers. All parameters were significant at the 0.01 level (2-tailed).

Parameter	Correlation Between the 2 Biometers: Both Eyes	Right Eyes	Left Eyes
Axial length*	0.98	0.99	0.99
Keratometric mean*	0.93	0.93	0.94
Anterior chamber depth†	0.84	0.86	0.82
Corneal diameter†	0.72	0.79	0.65

*Kendall τ correlation coefficient
†Pearson's product-moment correlation coefficient

Table 2 shows the correlation coefficients between the 2 biometers for AL. All parameters were significant at the 0.01 level (2-tailed)

Adapted from J Cataract Refract Surg. 2016;42(5):685-93.

CONCLUSIONS

- Except for ACD, there was no statistically significant difference in any parameter when both eyes were compared with the single-eye selection.
- This study found a statistically significant difference in all compared parameters between the 2 biometers. However, except for corneal diameter, these differences should not have a clinical impact because they were small.
- In addition to the traditional acquisition of AL, K, ACD, and corneal diameter measurements, the Aladdin biometer provides keratorefractive and keratoconus screening indices, pupillometry, and Zernike analysis, suggesting that this biometer would be useful in a refractive clinical setting.

Predictability of Biometry in Patients Undergoing Cataract Surgery

AUTHORS: Sorkin N, Rosenblatt A, Barequet IS.

PUBLICATION: Optometry and Vision Science. 2016 Dec;93(12):1545–51. doi:10.1097/opx.0000000000000990

STUDY PURPOSE

To compare the measurements of axial length (AL), corneal keratometry (K), and anterior chamber depth (ACD), and the refractive predictability of the Aladdin and IOLMaster® in cataract surgery subjects.

OVERVIEW

STUDY DESIGN

Retrospective observational study

STUDY DEVICE(S)

- Aladdin (Visia Imaging S.r.l., Italy)
- IOLMaster® (Carl Zeiss Meditec, Berlin, Germany)

OF EYES/SUBJECTS

127 consecutive eyes of 127 cataract subjects

OUTCOME MEASURES

- Correlation in and agreement of measurements of axial length (AL), corneal keratometry (K), and anterior chamber depth (ACD) between the Aladdin and IOLMaster®
- Prediction error of each device calculated based on the postoperative refraction

RESULTS

- The average AL was 24.18 ± 1.89 mm with the Aladdin and 24.18 ± 1.89 mm with the IOLMaster®. The difference between the devices was not statistically significant (p = 0.792). **Figure 1** shows a Bland-Altman plot of the agreement; the agreement was excellent (95% LoA, -0.09 to 0.09 mm).
- The average corneal keratometry readings were 43.84 ± 1.56 D with the Aladdin and 43.97 ± 1.61 D with the IOLMaster®, showing a small (0.12 D) but statistically significant difference between the devices (p < 0.001). Per the Bland-Altman plot, the agreement was very good (95% LoA, -0.30 to 0.55 D).

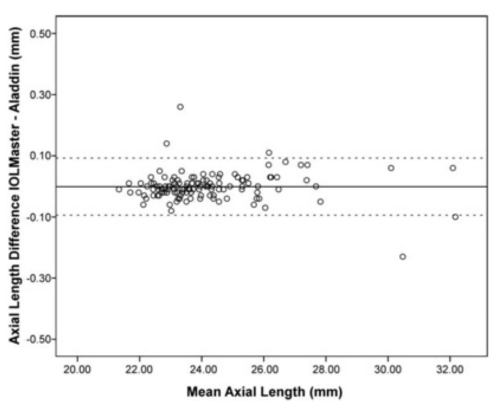

Figure 1 Bland-Altman plot showing the difference in the axial length (AL) with the Aladdin compared with the IOLMaster®. Measurement difference of AL versus the mean measurement of AL. The solid line represents the mean difference in measurement (mean difference = -0.001 mm). The dotted line represents the 95% limit of agreement (95% LoA, -0.09 to 0.09 mm). The confidence interval for the upper LoA was 0.100 to 0.084 mm, and the interval for the lower LoA was -0.086 to -0.103 mm.

Adapted from Optom Vis Sci. 2016;93(12):1545-1551.

- The mean absolute error (MAE) in predicting postoperative spherical equivalent was 0.54 ± 0.40 D for the Aladdin and 0.49 ± 0.41 D for the IOLMaster®. This difference of 0.05 ± 0.18 D is clinically insignificant, although it was found to be statistically significant (p = 0.022). When adjusting corneal keratometry measurements for the 0.12 D difference between the devices, there was no statistically significant difference in the prediction at all error ranges.

CONCLUSIONS

- The Aladdin and the IOLMaster® were equally successful in measuring axial length and corneal keratometry.
- Based on the preoperative intraocular lens calculation parameters and the postoperative outcome analysis, the Aladdin's measurements can be considered interchangeable with those provided by the IOLMaster®.

Comparison of Anterior Segment Measurements Obtained by Aladdin Optical Biometer and Sirius Corneal Topography

AUTHORS: Polat O, Baysal Z, Özcan S, İnan S, İnan ÜÜ.

PUBLICATION: Türk Oftalmoloji Dergisi. 2016 Dec;46(6):259-263. doi: 10.4274/tjo.60476. Epub 2016 Dec 1.

STUDY PURPOSE

To assess the agreement of anterior segment parameter measurements derived from Aladdin optical biometer using optical low coherence interferometer and Sirius corneal topography using combined Scheimpflug-Placido disk.

OVERVIEW

STUDY DESIGN

Retrospective observational study

STUDY DEVICE(S)

- Aladdin (Visia Imaging S.r.l., Italy)
- Sirius topography device (Costruzione Strumenti Oftalmici, Florence, Italy)

OF EYES/SUBJECTS

110 eyes of 59 subjects; mean age 47.31±18.57 years (range, 25 to 79 years)

OUTCOME MEASURES

Anterior chamber depth (ACD), flat (K1) and steep (K2) keratometry readings, and white-to-white distance (WTW) measurements

RESULTS

- Mean ACD values were 3.35±0.4 mm as measured by the Aladdin device and 3.42±0.44 mm using the Sirius device; the Aladdin device yielded significantly lower mean ACD values ($p<0.001$).
- Mean K1 values were 43.11±1.57 D using the Aladdin and 42.62±1.71 D using the Sirius. K1 measured significantly flatter with the Sirius device ($p<0.001$).
- K2 and WTW values measured by Aladdin were 44.04±1.61 D and 11.75±0.47 mm, respectively. In addition, K2 and WTW values measured by Sirius were 44.10±1.65 D and 11.76±0.55 mm, respectively. There were no significant differences in K2 or WTW measurements between the two devices ($p=0.183$ and $p=0.852$, respectively).
- The mean differences in Aladdin and Sirius measurements were -0.075±0.08 mm for ACD; 0.409±0.53 D for K1; -0.091±0.37 D for K2; and -0.015±0.33 mm for WTW. There was a high level of correlation between all anterior segment parameter measurements obtained with the two devices.

Table 1. Differences and correlations between anterior segment parameters measured by the Aladdin and Sirius instruments

		Confidence interval 95%		Pearson correlation	
Parameter	Difference ± SD (Aladdin-Sirius)	Lower limit	Upper limit	r	p value
ACD (mm)	-0.075±0.08	-0.092	-0.059	0.985	<0.001
K1 (D)	0.409±0.53	0.295	0.523	0.895	<0.001
K2 (D)	-0.091±0.37	-0.171	-0.011	0.961	<0.001
WTW (mm)	-0.015±0.33	-0.086	0.055	0.766	<0.001

ACD: Anterior chamber depth, K1: Flat keratometry value, K2: Steep keratometry value, WTW: White-to-white distance, SD: Standard deviation

Adapted from Türk Oftalmoloji Dergisi. 2016;46(6):259-63.

CONCLUSIONS

- Although there were significant differences between the Aladdin and Sirius instruments in the ACD and K1 parameters, there was high correlation between measurements in all studied parameters. The difference in ACD measurements may be clinically negligible, but it may not be appropriate to use these devices interchangeably to measure K1.
- Previous studies have also demonstrated that the Aladdin and Sirius devices both provide reproducible measurement. However, while using the anterior segment parameters measured by these devices it is important to know how their results compare with those of gold standard devices.

Accuracy of optical biometry combined with Placido disc corneal topography for intraocular lens power calculation

AUTHORS: Savini G, Hoffer KJ, Barboni P, Balducci N, Schiano-Lomoriello D, Ducoli P.

PUBLICATION: PLOS ONE. 2017 Feb 23;12(2). doi:10.1371/journal.pone.0172634

STUDY PURPOSE

To investigate the accuracy of a new optical biometer for intraocular lens (IOL) power calculation in eyes undergoing cataract surgery.

OVERVIEW

STUDY DESIGN

Prospective cohort study

STUDY DEVICE(S)

- Aladdin (Visia Imaging S.r.l., Italy)
- Keratron™ (Optikon 2000 Spa)
- Ocuscan® ultrasound (US) immersion biometry (Alcon Laboratories, Inc. Ft. Worth, TX)

OF EYES/SUBJECTS

74 eyes of 74 cataract subjects

OUTCOME MEASURES

Axial length, corneal power, IOL power, mean prediction error (PE), median absolute error (MedAE), percentage of eyes with PE ±0.50 D

RESULTS

- With the optical biometer, the ME was always less than or equal to 0.02 D as a result of constant optimisation.
- The MedAE was 0.25 D for all formulas and the rate of eyes with a PE less than or equal to 0.50 D ranged between 87.67 and 89.04%. With the Hoffer Q and Holladay 1 formulas, all eyes had a PE less than or equal to 1.00 D.
- IOL power calculation based on AL measured by immersion US biometry and K measured by Placido-disc corneal topography provided results that were close to those obtained with the Aladdin biometer. Notwithstanding slightly different mean K and AL values, no statistically significant differences were detected between the two techniques when comparing the absolute error and the percentage of eyes with a PE within ±0.50 D.

Table 1.

	Optical biometry + corneal topography	Ultrasound immersion biometry + corneal topography	Paired t-test
Corneal power	43.50 ±1.25 D (range: 40.00–46.07)	43.41 ±1.27 D (range: 39.80–46.37)	P = 0.0017
Axial length	24.04 ±1.29 mm (range: 21.09–30.17)	23.94 ±1.27 mm (range: 20.96–29.84)	P < 0.0001
Short eyes (axial length <22 mm)	2 (2.7%)	2 (2.7%)	N/A
Long eyes (axial length <26 mm)	5 (6.6%)	4 (5.4%)	N/A
Target refraction	-0.47 ±1.07 D (range: -3–0)		
Implanted IOL power	20.66 ±3.25 D (range: 10–35)		

Clinical features of the study eyes. D = diopters.

doi:10.1371/journal.pone.0172634.t001

Adapted from PLoS One. 2017;12(2).

Table 2.

	Hoffer Q (Aladdin)	Hoffer Q (SimK +US)	Holladay 1 (Aladdin)	Holladay 1 (SimK +US)	SRK/T (Aladdin)	SRK/T (SimK +US)
Mean optimized constant	5.69	5.45	1.91	1.68	119.11	118.77
Mean PE	0.02 ±0.33 D	0.01 ±0.37 D	0.02 ±0.34 D	0.01 ±0.36 D	0.00 ±0.36 D	-0.01 ±0.39 D
MedAE	0.25 D	0.16 D	0.25 D	0.19 D	0.25 D	0.19 D
MAE (±SD)	0.27 ±0.19 D	0.26 ±0.25 D	0.28 ±0.19 D	0.27 ±0.24 D	0.28 ±0.23 D	0.28 ±0.27 D
PE Variance	0.04 D	0.07 D	0.04 D	0.06 D	0.05 D	0.07 D
Eyes with PE within ±0.25 D	50.68%	71.23%	56.16%	65.75%	53.42%	61.64%
Eyes with PE within ±0.50 D	89.04%	86.30%	87.67%	87.67%	87.67%	86.30%
Eyes with PE within ±1.00 D	100.00%	97.26%	100.00%	98.63%	98.63%	95.89%

Refractive outcome predictability of IOL power calculation using the Aladdin optical biometer. D = diopters; MedAE = median absolute error; MAE = mean absolute error; SD = standard deviation; PE = prediction error.

doi:10.1371/journal.pone.0172634.t002

Adapted from PLoS One. 2017;12(2).

CONCLUSIONS

The optical biometer investigated in the present study provides accurate measurements for IOL power calculation.

Repeatability and agreement of ocular biometry measurements: Aladdin versus Lenstar

AUTHORS: McAlinden C, Gao R, Yu A, Wang X, Yang J, Yu Y, et al.

PUBLICATION: British Journal of Ophthalmology. 2017 Jan 27;101(9):1223–9. doi:10.1136/bjophthalmol-2016-309365

STUDY PURPOSE

To assess the repeatability and agreement between the Aladdin and Lenstar biometers.

OVERVIEW

STUDY DESIGN

Prospective comparative study

STUDY DEVICE(S)

- Aladdin (Visia Imaging S.r.l., Italy)
- Lenstar LS 900 (Haag-Streit, Köniz, Switzerland)

OF EYES/SUBJECTS

3 consecutive measurements of the right eye of 102 subjects (62 female) with mean age 28.4 ±8.7 years (range 18–56 years)

OUTCOME MEASURES

Primary: The mean, SD, repeatability (Sr) and repeatability limit (r) of the common parameters: axial length (AL) , anterior chamber depth (ACD), flat keratometry (Kf), steep keratometry (Ks), mean keratometry (Km), J0, J45 and white-to-white (WTW) distance

Secondary: LoA between the common measurement parameters and IOL power calculations

RESULTS

- For all parameters, the repeatability of the three measurements with each device was similar.
- The repeatability was marginally better with the Lenstar for AL, ACD and WTW distance.
- The repeatability was marginally better with the Aladdin for Kf, J0 and J45.
- The repeatability was the same with both devices for Ks and Km.
- Considering the repeatability limit (r), all results could be considered clinically acceptable.
- In terms of agreement between the two devices, the parameters and IOL formulas had narrow LoA, the exception being the WTW distance.
- For the four IOL formulas, the mean difference was very small, close to zero and differences were not statistically significant; the LoA were narrow and all within 0.50 D, implying acceptable use of each device interchangeably.

Parameters	Mean difference ± SD	p Value*	Lower 95% LoA (95% CI)	Upper 95% LoA (95% CI)
SRK/T (D)	0.01±0.19	0.691	−0.36 (−0.43 to −0.30)	0.38 (0.31 to 0.44)
Holladay 1 (D)	0.01±0.21	0.612	−0.40 (−0.47 to −0.33)	0.42 (0.35 to 0.50)
Hoffer Q (D)	0.02±0.22	0.468	−0.41 (−0.48 to −0.34)	0.44 (0.37 to 0.51)
Haigis (D)	0.02±0.22	0.421	−0.41 (−0.48 to −0.33)	0.44 (0.37 to 0.51)

*Two tailed.
D, dioptres.

FIGURE 1 The mean difference, SD, p value, limits of agreement (LoA) with 95% CIs of intraocular lens power calculations between the Aladdin and Lenstar LS 900 optical biometers.

Adapted from Br J Ophthalmol. 2017;101(9):1223-1229

CONCLUSIONS

- The results of this study found high levels of repeatability with the Aladdin which were similar to the Lenstar for common measurement parameters. In terms of agreement between the two devices, the parameters and IOL formulas had narrow LoA and may be considered clinically interchangeable.

Efficiency and measurements agreement between swept-source OCT and low-coherence interferometry biometry systems

AUTHORS: Calvo-Sanz JA, Portero-Benito A, Arias-Puente A.

PUBLICATION: Graefe's Archive for Clinical and Experimental Ophthalmology. 2018 Feb 1;256(3):559–66.
doi:10.1007/s00417-018-3909-9

STUDY PURPOSE

To compare and evaluate the agreement between the measurements obtained with a swept-source optical coherence tomography (OCT)-based biometer, the IOLMaster® 700 (IOLM), and those obtained by an optical biometer based on optical low-coherence interferometry (OLCI), the Aladdin (ALD).

OVERVIEW

STUDY DESIGN

Prospective comparative study

STUDY DEVICE(S)

- Aladdin (Visia Imaging S.r.l., Italy)
- IOLMaster® 700 (Carl Zeiss Meditec AG, Germany) (IOLM)

OF EYES/SUBJECTS

55 eyes of 55 subjects; Mean age was 73.12 ± 2.63 (62-89 years)

OUTCOME MEASURES

Axial length (AL), corneal power (K, in dioptres), anterior chamber depth (ACD), central corneal thickness (CCT), and lens thickness (LT)

RESULTS

- There were four of 55 subjects that obtained spherical corneal measurements with Aladdin (7.27%), and only one subject with spherical corneal measurements according to IOLMaster® 700 (1.82%). In those spherical corneal measurements from ALD, IOLM obtained a corneal astigmatism of 0.16 ± 0.04 D.
- The mean difference in AL measured by the SS-OCT biometer and the OLCI biometer was 0.003 mm, and it was not statistically significant ($p = 0.648$) (**Table 1**).
- Differences between K and LT values measured by both devices were not statistically significant (mean K difference = −0.068 D, $p = 0.228$; mean LT difference = −0.022 mm, $p = 0.298$) **(Table 1**).
- Intraclass correlation coefficient (ICC) showed high values of correlation between all measurements of the two devices (**Table 2**).

	Mean difference	SD	*P*-value	95% CI
ALX IOLMaster–Aladdin (mm)	−0.003	0.041	0.648	−0.014 to 0.008
Km IOLMaster–Aladdin (D.)	−0.068	0.413	0.228	−0.179 to 0.044
ACD IOLMaster–Aladdin (mm)	−0.036	0.025	< 0.001	−0.042 to −0.029
LT IOLMaster–Aladdin (mm)	−0.022	0.034	0.298	−0.054 to 0.017
CCT IOLMaster–Aladdin (µm)	9.296	7.131	< 0.001	527.715 to 545.322

CI = confidence interval of the difference

TABLE 1 Mean differences between devices (IOLMaster® – Aladdin).

Adapted from Adapted from Graefes Arch Clin Exp Ophthalmol. 2018 Mar;256(3):559-566.

	ICC
ALX IOLMaster–Aladdin	1.000
Km IOLMaster–Aladdin	0.970
ACD IOLMaster–Aladdin (mm)	0.994
LT IOLMaster–Aladdin (mm)	0.952
CCT IOLMaster–Aladdin (µm)	0.938

TABLE 2 ICC between. measures in both devices.

Adapted from Adapted from Graefes Arch Clin Exp Ophthalmol. 2018 Mar;256(3):559-566.

CONCLUSIONS

- Excellent correlation and agreement between measurements obtained with IOLMaster® 700 and Aladdin.

Validation of keratometric measurements obtained with an intraoperative image-guided system: intra-session repeatability and interchangeability with an optical biometer

AUTHORS: Ruiz-Belda C, Rodrigo F, Pinero DP.

PUBLICATION: Clin Exp Optom. 2018 Mar;101(2):200-205. doi: 10.1111/ cxo.12623. Epub 2017 Oct 31. PMID: 29090488.

STUDY PURPOSE

To evaluate the intra-session repeatability of keratometric measurements obtained in healthy eyes with the Verion image-guided system as well as the interchangeability of such measurements with those obtained with an optical biometer (Aladdin).

OVERVIEW

STUDY DESIGN

Prospective, non-randomised study

STUDY DEVICE(S)

- Verion™ image-guided system (Alcon Laboratories Inc, Fort Worth, Texas, USA)
- Aladdin (Visia Imaging S.r.l., Italy)

OF EYES/SUBJECTS

53 of 53 subjects (aged 31–67 years), with a mean age of 52.8 years

OUTCOME MEASURES

- Flat keratometry (K1), steep keratometry (K2), corneal astigmatism, and axis of the flattest meridian (AX1)
- Repeatability assessed using standard deviation (Sw)
- Agreement assessed with Bland–Altman plots

RESULTS

- K1, K2, and astigmatism values are statistically different but clinically acceptable.
- AX1 differences are not statistically significant, but clinically unacceptable, especially in low or oblique astigmatism.

Parameter	Mean Difference	Limits of Agreement	Significance
K1	+0.29 D	−0.35 to 0.93 D	**p < 0.001**
K2	+0.21 D	−0.38 to 0.80 D	**p < 0.001**
Astigmatism	−0.10 D	−0.55 to 0.35 D	**p = 0.004**
Flattest Axis (AX1)	+15.74°	−30.93° to +62.41°	**p = 0.385 (NS)**

TABLE 1 Interchangeability (Verion vs. Aladdin)

Adapted from Ruiz-Belda. Clin Exp Optom. 2018: 101(2): 200-205

CONCLUSIONS

- Although there were statistically significant differences among systems in K1, K2 and corneal astigmatism ($p < 0.01$), these differences were within a clinically acceptable level.
- Good agreement in axis between systems was found for astigmatism of more than 1.50 D (differences among devices of five degrees or below).

Comparison of three optical biometers: IOLMaster 500, Lenstar LS 900 and Aladdin

AUTHORS: Ortiz A, Galvis V, Tello A, Viaña V, Corrales MI, Ochoa M, et al.

PUBLICATION: International Ophthalmology. 2018 Aug 22;39(8):1809–18. doi:10.1007/s10792-018-1006-z

STUDY PURPOSE

To evaluate the results of optical biometry using the IOLMaster® 500, Lenstar LS 900 and Aladdin in eyes with cataract.

OVERVIEW

STUDY DESIGN

Retrospective observational study

STUDY DEVICE(S)

- Aladdin (Visia Imaging S.r.l., Italy)
- IOLMaster® 500 (Carl Zeiss AG, Oberkochen, Germany)
- Lenstar LS 900 (Haag-Streit AG, Koniz, Switzerland)

OF EYES/SUBJECTS

231 eyes of 152 subjects with cataract

OUTCOME MEASURES

Measurements of axial length (AL), anterior chamber depth (ACD) and average keratometry (mean K)

RESULTS

Table 2 Biometric parameters obtained with the three devices

Device	Axial length (mm)		Mean keratometry (Diopters)		Anterior chamber depth (mm)	
	n	Mean ± SD	*n*	Mean ± SD	*n*	Mean ± SD
Lenstar LS900	197	23.40 ± 1.45	203	43.95 ± 1.60	197	3.1 ± 0.41
Aladdin		23.40 ± 1.43		43.91 ± 1.63		3.1 ± 0.35
IOLMaster 500		23.36 ± 1.44		44.00 ± 1.66		3.0 ± 0.41

SD standard deviation

Adapted from International Ophthalmology. 2018;39(8):1809-18.

- In only 197 of the 231 eyes (85.3%), it was possible to obtain reliable measurements of AL with all the three devices; the differences in the failed measurement rate between the three systems were not statistically significant.
- The differences between the three biometers with regard to AL and mean K were very close to zero, showing no significant bias.
- There was a statistically significant difference in AL between IOLMaster® 500 and the remaining two biometers (P = 0.03). However, the amount of difference was considered clinically not significant (0.04 mm).
- The mean keratometry (mean K) was determined in 203 eyes (87.9%) with all the three devices. Differences in mean K were between - 0.1 and 0.06 dioptres (D), which were considered neither statistically (P>0.05) nor clinically significant.
- The anterior chamber depth (ACD) was determined in 197 eyes (85.28%) with all the three biometers. The differences between the three devices (0.03 to 0.13 mm) were not statistically significant and considered also clinically not significant.

CONCLUSIONS

- This study found an excellent clinical correlation between three instruments of modern optical biometry (IOLMaster® 500, Lenstar LS 900 and Aladdin).
- There were no clinically significant differences between these 3 biometers in AL, mean K and ACD.
- The performance of the three devices in different degrees of cataract was also comparable.

Agreement between lens thickness measurements by ultrasound immersion biometry and optical biometry

AUTHORS: Savini G, Hoffer KJ, Schiano-Lomoriello D.

PUBLICATION: Journal of Cataract and Refractive Surgery. 2018 Dec;44(12):1463–8. doi:10.1016/j.jcrs.2018.07.057

STUDY PURPOSE

To compare lens thickness measurements provided by immersion ultrasound (US) biometry and optical biometry.

OVERVIEW

STUDY DESIGN

Prospective evaluation of diagnostic technology

STUDY DEVICE(S)

- Immersion US biometry (Ocuscan® RX, Alcon Laboratories, Inc.)
- Aladdin (Visia Imaging S.r.l., Italy)
- Galilei G6 (Ziemer Ophthalmic Systems AG)
- OA-2000 (Tomey Corp.)

OF EYES/SUBJECTS

88 eyes of 88 subjects

OUTCOME MEASURES

Axial length (AL), anterior chamber depth (ACD), and lens thickness

RESULTS

- Ultrasound immersion biometry yielded significantly higher lens thickness values than all of the optical biometers (P < .0001). The mean difference ranged between 0.29 mm and 0.43 mm.
- Although the differences between the 3 optical biometers were smaller, they were still statistically significant (P < .001).
- With respect to the immersion US biometry, lens thickness measurements using the optical biometric measurements would have resulted in the selection of a lower IOL power in between 43.2% and 62.5% of eyes, depending on the optical biometer. Comparison of the measurements of the 3 optical biometers showed that a different IOL power would have been selected in between 9.1% and 19.3% of eyes.

Table 1. Axial measurements provided by the 4 technologies.

Parameter	US Immersion	OLCI	PCI	SS-OCT	*P* Value
LT (mm)					
Mean ± SD	4.94 ± 0.40	4.59 ± 0.42	4.51 ± 0.38	4.66 ± 0.39	<.0001
Range	3.99, 5.74	3.64, 5.52	3.59, 5.26	3.68, 5.46	
ACD (mm)					
Mean ± SD	3.29 ± 0.37	3.23 ± 0.36	3.26 ± 0.37	3.23 ± 0.35	<.0001
Range	2.26, 4.26	2.25, 4.27	2.24, 4.26	2.37, 4.26	
AL (mm)					
Mean ± SD	23.96 ± 1.43	24.02 ± 1.46	24.03 ± 1.48	24.02 ± 1.46	<.0001
Range	20.17, 28.47	20.21, 28.72	20.23, 28.79	20.25, 28.69	

Adapted from J Cataract Refract Surg. 2018;44(12):1463-1468.

CONCLUSIONS

- Lens thickness measurements by immersion US biometry and optical biometry cannot be considered interchangeable.
- Minor, but still significant, differences between the 3 optical biometers tested were also found.

Intraocular lens power calculation in eyes with keratoconus

AUTHORS: Savini G, Abbate R, Hoffer KJ, Mularoni A, Imburgia A, Avoni L, D'Eliseo D, Schiano-Lomoriello D.

PUBLICATION: Journal of Cataract and Refractive Surgery. 2019;45(5):576-582. doi: 10.1016/j.jcrs.2018.11.029

STUDY PURPOSE

To assess the refractive accuracy of different formulas for intraocular lens (IOL) power calculation in eyes with keratoconus.

OVERVIEW

STUDY DESIGN

Multicentre, retrospective, interventional study

STUDY DEVICE(S)

- IOLMaster® 500 or IOLMaster® 700 (Carl Zeiss Meditec AG)
- AL-Scan (Nidek Co. Ltd.)
- Aladdin (Visia Imaging S.r.l., Italy)

OF EYES/SUBJECTS

41 eyes of 41 subjects with keratoconus undergoing cataract surgery

OUTCOME MEASURES

- Prediction Error (PE)
- Median Absolute Error (MedAE)
- % within ±0.50 D, ±0.75 D, ±1.00 D

RESULTS

Table 1. Number of different IOL models implanted in the eyes of the study patients.

IOL Model	Manufacturer	Number
AcrySof SN60WF	Alcon Laboratories, Inc.	8
AcrySof Toric SN6AT (2-9)	Alcon Laboratories, Inc.	12
AcrySof MA60AC	Alcon Laboratories, Inc.	1
MA60MA	Alcon Laboratories, Inc.	1
Sensar AR40	Abbott Medical Optics, Inc.	2
Tecnis 1 ZCB00	Abbott Medical Optics, Inc.	2
FineVision	Physiol S.A.	1
iSert Micro 251	Hoya Corp.	1
FIL611	Soleko SPA	1
Acriva 611/613	VSY Biotechnology	12

IOL = intraocular lens

Adapted from Journal of Cataract and Refractive Surgery. 2019;45(5):576-582.

- All formulas tended to cause hyperopic surprises (i.e., positive prediction error).
- SRK/T consistently performed best:
  - *Lowest mean PE and MedAE*
  - *Best performance in stages I and II*
- In Stage I, 61.9% of eyes were within ±0.50 D (vs. ~25–43% for others).
- In Stage III, none of the formulas provided reliable results (MedAE > 2.5 D).
- Prediction errors correlated with K values in all formulas — steeper corneas worsened accuracy.

CONCLUSIONS

- IOL calculations in keratoconus are far less accurate than in normal eyes. In general, all formulas produced a positive PE, meaning that a hyperopic refractive outcome is likely to occur in most keratoconus subjects.
- SRK/T is the most reliable formula, especially in mild (Stage I) cases.
- Advanced stages (Stage III) show high unpredictability regardless of formula.
- The Barrett Universal II did not outperform SRK/T, despite its success in normal eyes.

Ocular measurements of a swept-source biometer: Repeatability data and comparison with an optical low-coherence interferometry biometer

AUTHORS: Nemeth G, Modis L.

PUBLICATION: Journal of Cataract and Refractive Surgery. 2019 Jun;45(6):789–97. doi:10.1016/j.jcrs.2018.12.018

STUDY PURPOSE

To assess the repeatability of a swept-source biometer in phakic and pseudophakic subjects, including astigmatism analysis, and to compare measurement data with those obtained by an optical low-coherence interferometry method.

OVERVIEW

STUDY DESIGN

Evaluation of diagnostic technologies

STUDY DEVICE(S)

- Argos® (Movu, Inc.)
- Aladdin (Visia Imaging S.r.l., Italy)

OF EYES/SUBJECTS

96 eyes (50 phakic and 46 pseudophakic) of 96 subjects (mean age 69.22 years and 71.14 years, respectively)

OUTCOME MEASURES

- ACD (anterior chamber depth), AL (axial length), CCT (central corneal thickness), CD (corneal diameter), LT (lens thickness)
- J0 (Jackson cross-cylinder axes at 180 and 90 degrees), J45 (Jackson cross-cylinder axes at 45 and 135 degrees), PS (pupillary size), K1 (keratometric value at the flattest meridian), K2 (keratometric value at the steepest meridian)

RESULTS

- A comparison of the means of the measured parameters by the two devices showed a significant difference regarding astigmatism and corneal diameter in the phakic group. In the pseudophakic group, only the corneal diameter data were significantly different (measured larger by Argos, P = .02). No other statistically significant differences were observed in either group.
- In the whole phakic group, the Bland-Altman plots showed excellent agreement for AL and ACD, whereas in the case of CCT (95% LoA, -30.8 to 10.8 mm), corneal diameter (95% LoA, -0.07 to 1.5 mm), astigmatism (95% LoA, -0.86 to 0.45 D), J0 (95% LoA, -0.37 to 0.41) and J45 (95% LoA, -0.19 to 0.38), the agreement was clinically not acceptable.
- In the whole pseudophakic group, the Bland-Altman plots showed excellent agreement for AL, whereas in the case of CCT (95% LoA, -32.1 to 22.0 mm), ACD (95% LoA, -3.6 to 2.4 mm), corneal diameter (95% LoA, 0.35 to 1.48 mm), astigmatism (95% LoA, -0.91 to 0.68 D), J0 (95% LoA, -0.40 to 0.48) and J45 (95% LoA, -0.42 to 0.53), the agreement was also not acceptable clinically.

CONCLUSIONS

- Only limited agreement was observed between the Argos and Aladdin devices in both phakic and pseudophakic subjects, except for AL and ACD in the phakic group and AL in the pseudophakic group; therefore, they are not interchangeable in clinical practice.

Agreement of ocular biometry measurements between 2 biometers

AUTHORS: Yeu E.

PUBLICATION: Journal of Cataract and Refractive Surgery. 2019 Aug;45(8):1130–4. doi:10.1016/j.jcrs.2019.03.016

STUDY PURPOSE

To evaluate the agreement of measurements between the Aladdin OLCI biometer and the Lenstar OLCR biometer in eyes in men and women having routine cataract surgery.

OVERVIEW

STUDY DESIGN

Prospective single-centre cross-sectional study

STUDY DEVICE(S)

- Aladdin (Visia Imaging S.r.l., Italy)
- Lenstar (Haag-Streit, Inc.)

OF EYES/SUBJECTS

101 eyes (65 right eyes) of 101 subjects (mean age 67.9 years 7.2 [SD])

OUTCOME MEASURES

Measurements of axial length (AL), anterior chamber depth (ACD), keratometry (K) values (flat K, steep K, steep K axis), lens thickness, central corneal thickness (CCT), and the white-to-white (WTW) distance

RESULTS

- There was a high level of correlation between all anterior segment parameter measurements obtained by the 2 devices.
- The mean AL was 23.88 ± 1.23 mm with the OLCI biometer and 23.89 ± 1.23 mm with the OLCR biometer, with no statistical significance between the devices (P > .05). The mean difference was 0.01 ± 0.03 mm (**Figure 1**).
- The mean ACD was 3.24 ± 0.36 mm with the OLCI biometer and 3.25 ± 0.37 mm with the OLCR biometer, with no statistical significance between the devices (P > .05). The mean difference was 0.02 ± 0.11 mm (**Figure 2**).
- There was a high level of correlation between all anterior segment parameter measurements obtained by the 2 devices. The Pearson coefficient was r =1.000, r = 0.992, r = 0.991, r = 0.955, r = 0,965, r = 0.819, r = 0.990, and r = 0.919 for AL, K1, K2, steep K axis, ACD, lens thickness, CCT, and WTW, respectively.

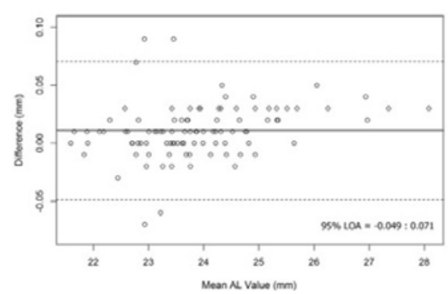

FIGURE 1 Bland-Altman plot of AL (AL = axial length; LoA = limits of agreement).

Adapted from J Cataract Refract Surg. 2019;45(8):1130-1134.

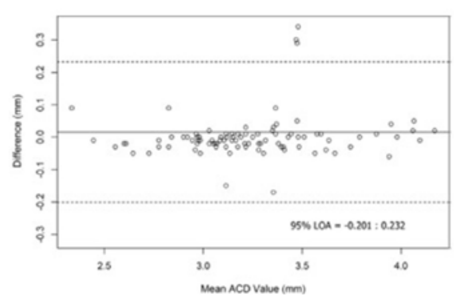

FIGURE 2 Bland-Altman plot of ACD (ACD = anterior chamber depth; LoA = limits of agreement).

Adapted from J Cataract Refract Surg. 2019;45(8):1130-1134.

CONCLUSIONS

- The findings in the present study add to the evidence that Aladdin is a reliable and accurate instrument for performing biometric measurements. Its measurements were as reliable and reproducible as those the Lenstar biometer, a commonly used device.

Accuracy of thick-lens intraocular lens power calculation based on cutting-card or calculated data for lens architecture

AUTHORS: Naeser K MD DSMC, Savini G MD.

PUBLICATION: Journal of Cataract & Refractive Surgery. 2019;45(10):1422-1429. doi: 10.1016/j.jcrs.2019.05.021

STUDY PURPOSE

To compare the accuracy of a thick-lens intraocular lens (IOL) power formula using the manufacturer's cutting-card information (the Naeser 1 formula) and calculated data from open sources (the Naeser 2 formula) for IOL architecture; and to compare these results with the achievements of the Barrett Universal II, Haigis, Hoffer Q, Holladay 1, and SRK/T formulas.

OVERVIEW

STUDY DESIGN

Retrospective case series

STUDY DEVICE(S)

- Aladdin (software version 1.6.0, by Visia Imaging S.r.l., Italy)

OF EYES/SUBJECTS

151 eyes of 151 subjects post-cataract surgery. The mean age of the 80 men and 71 women was 73 years +/- 9.7 (SD) (range 42 to 92 years).

OUTCOME MEASURES

- Axial length (AL), anterior chamber depth (ACD), corneal curvature
- Mean Error (ME), Mean Absolute Error (MAE), Median Absolute Error (MedAE), and error correlation with AL

RESULTS

- The ME was close to zero for all optimised formulas, but it differed statistically significantly from zero for the Hoffer Q and the Holladay 1 formulas. The ME (P = .278) and the variances for arithmetic errors (P = .248) were similar for all 7 formulas.
- The error in refraction was independent of ALs for the Næser formulas. Nonsignificant correlations between ALs and errors in refraction were observed for the Barrett, Haigis, and SRK/T formulas. The Hoffer Q and the Holladay 1 formulas demonstrated statistically significant trends toward myopic errors for short and hyperopic errors for long eyes.

Table 2. Optimization constants derived from the 7 intraocular lens power formulas.

Formula	Optimization Constants
Næser 1[5]	c = 1.560; d = 0.939
Næser 2	c = 1.441; d = 0.940
Barrett Universal II[A]	LF = 1.94
Haigis[1]	a0 = −1.020; a1 = 0.306; a2 = 0.220
Hoffer Q[2]	pACD = 5.72
Holladay 1[3]	SF = 1.95
SRK/T[4]	A-constant = 119.11

a0, a1, a2 = Haigis constants; c, d = Næser constants; LF = lens factor; pACD = predicted anterior chamber depth; SF = surgeon factor

Adapted from Journal of Cataract & Refractive Surgery. 2019;45(10):1422-1429.

CONCLUSIONS

- The two Næser formulas demonstrated identical clinical and statistical accuracies. The exact information provided from the cutting cards are therefore insignificant in comparison to other sources of error. Therefore, the Næser 2 formula with calculated IOL data may conveniently be used, and clinicians will not need to retrieve cutting-card information, as required for the Næser 1 equation.
- The Næser thick-lens IOL power equations based on calculated and manufacturer's IOL data provided similar accuracies and performed approximately as the best thin-lens formulas. The refractive errors were independent of ALs in both Næser formulas. Cutting-card information is not necessary in current IOL power calculation.

Visual and Refractive Outcomes after Cataract Surgery with a Monofocal Intraocular Lens Using Two Optical Biometers: IOL Master and Aladdin with EyeCeeOne Preloaded IOL

AUTHORS: Parafita-Fernandez A, Moraña MN, Garcia-Borregon J, Jabif M, Soares da Costa JC, Feal A, Viso E

PUBLICATION: Journal of Ophthalmology and Advance Research. 2021;2(2):1-7. doi: 10.46889/JOAR.2021.22202

STUDY PURPOSE

To compare visual and refractive outcomes following cataract surgery using a monofocal preloaded intraocular lens (EyeCee One), with IOL power calculated by two different optical biometers: IOL Master 500 and Aladdin.

OVERVIEW

STUDY DESIGN

Retrospective study

STUDY DEVICE(S)

- Aladdin (Visia Imaging S.r.l., Italy)
- IOLMaster® 500 (Carl Zeiss Meditec, Germany)
- EyeCee® One Preloaded (Bausch and Lomb, Rochester, USA)

OF EYES/SUBJECTS

Two groups of 38 eyes (76 subjects)

All eyes underwent cataract surgery, followed by EyeCeeOne Preloaded IOL implantation, in two different centres from March 2018-March 2019

OUTCOME MEASURES

- AL measurements using partial coherence interferometry
- SRK/T formula was used in every case

RESULTS

- There were no statistically significant differences among the groups. Thirty-eight right eyes in both groups (17 males and 21 females in the Aladdin group and 16 males and 22 females in the IOLMaster® groups) were included. Three eyes (7.9 %) in the Aladdin group and 5 eyes (13.2 %) in the IOLMaster® group presented pseudo exfoliation syndrome.
- Best corrected distance visual acuity was better in the Aladdin group. There were no other differences in the rest of the postoperative visual and refractive outcomes, nor in the IOL power selection (implanted) by the surgeon or the predicted spherical equivalent suggested by the biometers. None of the subjects showed substantial posterior capsular opacification during the 6-month follow-up.
- In the Aladdin group, 84.2% of the subjects showed a SE between ±0.5 D and 94.7% of them between ±1.0 D, while in the IOLMaster® group 81.5% of the subjects showed a SE between ±0.5 D and 94.7% of them between ±1.0 D.

PRE-OP	Aladdin (n= 38)	IOL-Master (n= 38)	P-value
Age	73.48 ± 11.01 (48 – 91)	74.95 ± 9.07 (57 – 92)	0.533
K1 (D)	43.80 ± 1.40 (40.58 – 46.21)	43.70 ± 2.04 (37.54 – 47.47)	0.815
K2(D)	44.52 ± 1.34 (42.03 – 46.77)	44.46 ± 2.09 (38.54 – 48.21)	0.863
ASTIGM (D)	0.72 ± 0.34 (0.00 – 1.31)	0.76 ± 0.37 (0.12 – 1.49)	0.646
AXL (D)	23.36 ± 0.89 (22.13 – 25.71)	23.35 ± 0.88 (22.13 – 25.34)	0.929
IOL EMM (D)	21.94 ± 2.27 (16.42 – 25.20)	21.52 ± 1.79 (15.92 – 24.74)	0.376

K1: flat meridian; K2: steep meridian; Astigm: astigmatism; AXL: axial length; IOL EMM: intraocular lens power for emmetropia.

Adapted from Journal of Ophthalmology and Advance Research. 2021;2(2):1-7.

	Aladdin (n= 38)	IOL-Master (n= 38)	P-value
IOL Implanted	22.21 ± 2.21 (17.0 – 25.5)	21.86 ± 1.78 (16.5 – 25.0)	0.439
Diff Impl - Emm	0.28 ± 0.20 (-0.13 – 0.73)	0.34 ± 0.21 (-0.47 – 0.68)	0.217
Predicted SE	-0.18 ± 0.14 (-0.5 – 0.09)	-0.22 ± 0.14 (-0.43– 0.32)	0.265
Obtained SE	-0.21 ± 0.34 (-1.12 – 0.5)	-0.13 ± 0.43 (-1.38 – 1.13)	0.359
Diff Obt – Pred SE	-0.02 ± 0.34 (-0.95 – 0.67)	0.10 ± 0.39 (-1.00 – 1.45)	0.179
UDVA	0.87 ± 0.13 (0.6 – 1.0)	0.84 ± 0.19 (0.4 – 1.0)	0.409
BCDVA	0.97 ± 0.07 (0.8 – 1.0)	0.95 ± 0.08 (0.8 – 1.0)	0.245
Sphere	-0.07 ± 0.32 (-0.75 – 1.0)	0.07 ± 0.45 (-1.00 – 1.5)	0.145
Cylinder	-0.30 ± 0.35 (-1.0 – 0)	-0.38 ± 0.55 (-1.75 – 0)	0.472

Diff Impl-Emm: difference between power of the implanted IOL and the one needed for emmetropia; Diff Obt – Pred SE: difference between obtained spherical equivalent and the predicted spherical equivalent by SRK-T formula. UDVA: uncorrected distance visual acuity; BCDVA: best corrected distance visual acuity.

Table 2: IOL power selection, spherical equivalent prediction and postoperative visual and refractive outcomes.

Adapted from Journal of Ophthalmology and Advance Research. 2021;2(2):1-7.

CONCLUSIONS

- Both Aladdin and IOLMaster® 500 are reliable for IOL power calculation when properly optimised.
- Slight tendency toward hyperopia in the IOLMaster® group suggests the potential need for A-constant adjustment.
- Aladdin offers added features, like Placido topography, which may benefit certain cases.

Evaluation of 6 biometers based on different optical technologies

AUTHORS: Montés-Micó R.

PUBLICATION: Journal of Cataract and Refractive Surgery. 2022 Jan;48(1):16–25. doi:10.1097/j.jcrs.0000000000000690

STUDY PURPOSE

To evaluate repeatability and agreement between various biometric parameters using 6 biometers based on different optical technologies.

OVERVIEW

STUDY DESIGN

Prospective, comparative case series

STUDY DEVICE(S)

- Aladdin (Visia Imaging S.r.l., Italy)
- AL-Scan (Nidek Co., Ltd.)
- Argos® (Alcon Laboratories, Inc.)
- IOLMaster® 700 (Carl Zeiss Meditec AG)
- Lenstar LS 900 (Haag Streit AG)
- OA-2000 (Tomey Corp.)

OF EYES/SUBJECTS

150 eyes

OUTCOME MEASURES

Keratometry (K1 and K2), J0 and J45, central corneal thickness (CCT), anterior chamber depth (ACD), lens thickness (LT), axial length (AL), white to white (WTW), and pupil size (PS) were measured 5 times with each device

RESULTS

- The CoR values were also distributed between these 2 groups of biometers, from 0.02 to 0.05 for the IOLMaster® 700, Argos, and OA-2000 to 0.15 to 0.19 for the Aladdin, Lenstar LS 900, and AL-Scan. Higher CoV values were found for CCT, ACD, LT, and WTW, ranging from 0.38% to 1.61%.
- There were statistically significant differences between biometers for all parameters evaluated (P < .001), and these differences varied as a function of the parameter analysed.
- The limit of agreement (LoA) width of some comparisons for K1 and the majority for K2 were >0.50 dioptre. A similar pattern was found for J0/J45. For CCT, many comparisons showed LoA width values of >25 mm. The LoA width for ACD ranged from 0.366 mm to 0.175 mm and for LT was about 0.2 mm. AL showed a highest LoA width of 0.225 mm. The LoA width for WTW was, in most cases, about ≥0.50 mm. The LoA width for PS ranged from 1.578 mm to 3.541 mm.

Table 1. Mean ± SD Values (Range) for the 6 Devices.

Parameter	Aladdin	AL-Scan	Argos	IOLMaster 700	Lenstar LS 900	OA-2000	*P* value
K1 (D)	43.25 ± 1.48 38.61, 47.28	43.22 ± 1.49 38.50, 47.33	43.22 ± 1.48 38.52, 47.18	43.19 ± 1.48 38.51, 47.25	43.17 ± 1.48 38.45, 47.14	43.20 ± 1.49 38.57, 47.26	<.001*
K2 (D)	44.18 ± 1.59 38.93, 49.71	44.21 ± 1.59 38.93, 49.81	44.26 ± 1.59 39.30, 49.51	44.14 ± 1.60 38.88, 49.43	44.14 ± 1.61 38.67, 49.48	44.16 ± 1.60 39.05, 49.63	<.001*
J_0 (D)	0.36 ± 0.34 −0.39, 1.41	0.37 ± 0.37 −0.43, 1.23	0.40 ± 0.36 −0.34, 1.26	0.35 ± 0.35 −0.46, 1.40	0.36 ± 0.36 −0.41, 1.23	0.37 ± 0.36 −0.45, 1.33	<.001*
J_{45} (D)	−0.01 ± 0.23 −0.93, 0.61	−0.01 ± 0.24 −0.90, 0.63	−0.08 ± 0.24 −0.94, 0.66	−0.01 ± 0.23 −0.82, 0.71	−0.02 ± 0.25 −0.93, 0.71	−0.02 ± 0.23 −0.79, 0.65	<.001*
CCT (µm)	540.33 ± 33.65 425.80, 634.80	547.10 ± 32.52 448.40, 626.40	535.92 ± 33.46 428.20, 620.40	537.62 ± 35.48 432.60, 640.20	542.51 ± 34.10 442.20, 633.80	529.24 ± 32.87 429.20, 624.20	<.001*
ACD (mm)	3.56 ± 0.34 2.33, 4.25	3.57 ± 0.34 2.33, 4.18	3.58 ± 0.34 2.32, 4.30	3.52 ± 0.35 2.29, 4.23	3.52 ± 0.34 2.30, 4.21	3.56 ± 0.34 2.34, 4.21	<.001*
LT (mm)	3.88 ± 0.47 3.07, 5.01	NA	4.00 ± 0.44 3.19, 5.04	3.89 ± 0.47 3.06, 4.92	3.91 ± 0.47 3.10, 5.02	3.89 ± 0.49 3.15, 5.07	<.001*
AL (mm)	24.08 ± 1.37 20.46, 27.79	24.03 ± 1.37 20.42, 27.77	24.10 ± 1.34 20.43, 27.72	24.08 ± 1.38 20.43, 27.82	24.09 ± 1.38 20.43, 27.83	24.08 ± 1.38 20.45, 27.79	<.001*
WTW (mm)	11.85 ± 0.33 10.95, 12.66	12.12 ± 0.38 11.12, 13.10	12.14 ± 0.39 11.10, 13.14	12.19 ± 0.34 11.32, 13.12	12.27 ± 0.38 11.34, 13.15	12.16 ± 0.36 11.26, 13.08	<.001*
PS (mm)	3.63 ± 0.54 2.74, 5.08	5.04 ± 1.01 2.70, 7.74	4.00 ± 0.80 2.47, 6.63	4.18 ± 0.95 2.46, 6.82	3.80 ± 0.56 2.63, 5.64	4.58 ± 0.87 2.60, 6.96	<.001*

ACD = anterior chamber depth; AL = axial length; CCT = central corneal thickness; J_0 = Jackson cross-cylinder at 0 and 90 degrees; J_{45} = Jackson cross-cylinder at 45 degrees and 135 degrees; K = keratometry; LT = lens thickness; NA = not available; PS = pupil size; WTW = white to white
*Significant differences <0.05

Adapted from J Cataract and Refract Surg. 2022;48(1):16-25.

CONCLUSIONS

- The results revealed that the 6 devices showed high levels of repeatability. The ICC values were >0.94 except for WTW measured with the AL-Scan (0.86) and Lenstar LS 900 (0.85). As a general trend among the 6 biometers, we have to point out that AL is the parameter with the highest predictability (better for SS-OCTs) followed by K1, K2, J0, J45, CCT, and WTW. In fact, PS, ACD, and LT showed lower predictability values compared with the others.

Comparative Analysis of Axial Length Measurements by Optical Biometers Based on Partial Coherence Interferometry Versus Optical Low-Coherence Interferometry: An Office Audit

AUTHORS: Bhullar H, Dhurjon L, Francis C, Bhambhwani V.

PUBLICATION: Cureus. 2022 Feb 3;14(2):e21883. doi: 10.7759/cureus.21883.

STUDY PURPOSE

To compare axial length (AL) measurements of the IOLMaster® 500 (Carl Zeiss Meditec AG, Jena, Germany), based on partial coherence interferometry (PCI) versus the Aladdin (Topcon Healthcare, Oakland, NJ), based on optical low-coherence interferometry (OLCI), in a clinical setting.

OVERVIEW

STUDY DESIGN

Retrospective study

STUDY DEVICE(S)

- IOLMaster® 500 (Carl Zeiss Meditec AG, Jena, Germany)
- Aladdin (Visia Imaging S.r.l., Italy)

OF EYES/SUBJECTS

393 eyes (197 subjects)

OUTCOME MEASURES

- Axial length (AL)
- Unpaired t-test
- Chi-squared test

RESULTS

- The IOLMaster® 500 was unable to successfully obtain AL measurements in 7 eyes (1.8%) and the Aladdin in 26 eyes (6.6%). The difference was statistically significant (p=0.0007). Advanced and central posterior subcapsular cataracts were common in eyes that had unsuccessful measurements.
- In the eyes successfully measured, the mean AL for the IOLMaster® was 24.04 ±1.32 mm, while it was 24.04 ±1.34 mm for the Aladdin. However, this difference was not statistically significant (p=0.9165).

	Axial length by the Aladdin	Axial length by the IOLMaster
Total number of eyes	393	393
Measured/recorded	367	386
Not measured/not recorded	26	7
P-value (Chi-squared test)	0.000727	

TABLE 1: Axial length measurements (successful and unsuccessful) by the two biometers

Adapted from Cureus 2022;14(2):e21883.

	Axial length (mm) (mean ±standard deviation)
IOLMaster	24.04 ±1.32
Aladdin	24.04 ±1.34
P-value (unpaired t-test)	0.9165

TABLE 2: Axial length measurements (mean and standard deviation) by the two biometers

Adapted from Cureus 2022;14(2):e21883.

CONCLUSIONS

- The study reiterates that AL measurements by the two biometers show no statistically significant difference, as long as the machine successfully measures PCI and OLCI.

Intraocular lens power calculation with ray tracing based on AS-OCT and adjusted axial length after myopic excimer laser surgery

AUTHORS: Savini G, Abbate R, Hoffer K, Mularoni A, Imburgia A, Avoni L, D'Eliseo D, Schiano-Lomoriello D.

PUBLICATION: Journal of Cataract & Refractive Eye Surgery. 2022;48(8):947-953. doi:10.1097/j.jcrs.0000000000000902

STUDY PURPOSE

To evaluate the accuracy of ray tracing for intraocular lens (IOL) power calculation in eyes with previous myopic excimer laser surgery, using: AS-OCT (MS-39) + Placido topography and an Adjusted axial length (AL) values based on polynomial corrections.

OVERVIEW

STUDY DESIGN

Retrospective interventional case series

STUDY DEVICE(S)

- Aladdin (software v. 1.6.0, Visia Imaging S.r.l., Italy)
- MS-39 (Costruzione Strumenti Oftalmici)

OF EYES/SUBJECTS

39 eyes of 39 subjects with prior myopic LASIK or PRK

OUTCOME MEASURES

- IOL power calculation performed by MS-39 software, with corneal thickness and asphericity taken into account
- IOL power was also calculated with Barrett True K method
- Instat and MedCalc were used for statistical analysis

RESULTS

- The use of original AL led to significant hyperopic surprise
- Wang-Koch overcorrected, resulting in myopic shifts
- Ray tracing + Holladay AL adjustments outperformed Barrett True-K in this population

Method	Mean Prediction Error (PE)	MedAE	% within ±0.50 D
Original AL	+0.56 D (hyperopic)	0.61 D	38%
Wang-Koch AL	−0.41 D (myopic)	0.38 D	56%
Holladay 1 poly AL	−0.10 D	0.37 D	72%
Holladay 2 poly AL	**+0.08 D**	**0.25 D**	**77%**
Barrett True-K (measured PCP)	−0.41 D	0.40 D	59%

Adapted from Journal of Cataract & Refractive Eye Surgery. 2022;48(8):947-953.

- Predicted IOL position was slightly overestimated on average (by ~0.09 mm), but this did not significantly impact refractive prediction accuracy

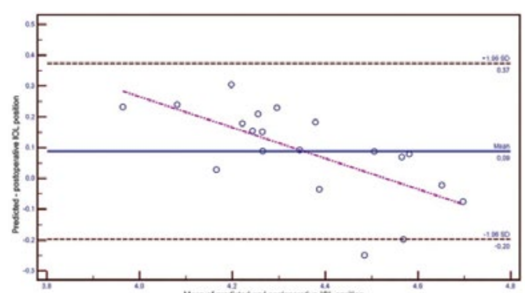

FIGURE 4 Agreement between predicted and postoperative IOL position: Bland-Altman plot showing good agreement with a proportional bias.

Adapted from Journal of Cataract & Refractive Eye Surgery. 2022;48(8):947-953.

CONCLUSIONS

- The ray-tracing software included in the AS-OCT tested in this study provides accurate results when calculating the IOL power in eyes with previous myopic excimer laser surgery and these results are improved by equations that optimise the AL value provided by optical biometry.

Corneal diameter measurements by 3 optical biometers and their effect on phakic intraocular lens sizing

AUTHORS: Savini G, Lupardi E, Hoffer KJ, Aramberri J, Schiano-Lomoriello D.

PUBLICATION: Journal of Cataract and Refractive Surgery. 2022 Nov;48(11):1292–6. doi:10.1097/j.jcrs.0000000000000976

STUDY PURPOSE

To compare phakic intraocular lens size calculations based on corneal diameter (CD) measurements by 3 instruments.

OVERVIEW

STUDY DESIGN

Retrospective interventional case series

STUDY DEVICE(S)

- Aladdin (software v. 1.6.0, Visia Imaging S.r.l., Italy)
- IOLMaster® 700 (software v. 1.90, Carl Zeiss Meditec AG)
- Pentacam® AXL Wave (software v. 1.25r15, Oculus Optikgerate GmbH)

OF EYES/SUBJECTS

54 eyes (29 subjects)

OUTCOME MEASURES

CD, Implantable collamer lens (ICL) size, vaulting, and optimal ICL sizing (OIS)

RESULTS

- Vaulting (mean: 558 ± 261 µm) was within 251 and 1000 µm in 49 eyes (83.3%).
- The mean difference between the simulated ICL size and OIS ranged between -0.11 ± 0.35 mm and 0.10 ± 0.30 mm (P < .0001), with no statistically significant difference between the IOLMaster® 700 and Pentacam AXL Wave. The simulated ICL size was equal to CAOIS in 38 eyes (70.37%) with the Aladdin, 37 eyes (68.52%) with the IOLMaster® 700, and 39 eyes (72.22%) with the Pentacam AXL Wave, without any statistically significant difference.
- The CD measurement of each device entered into the online calculator would have been the same as the CAOIS in 38 eyes (70.37%) with the Aladdin, 37 eyes (68.52%) with the IOLMaster® 700, and 39 eyes (72.22%) with the Pentacam AXL Wave.

Table 2. The mean simulated ICL size as measured by the 3 optical biometers and difference compared with OIS

Simulated ICL size (mm)				Δ-OIS (mm)		
Aladdin	IOLMaster 700	Pentacam AXL Wave	OIS (mm)	Aladdin	IOLMaster 700	Pentacam AXL Wave
13.14 ± 0.34	13.37 ± 0.29	13.32 ± 0.31	13.26 ± 0.35	−0.11 ± 0.35	0.10 ± 0.30	0.04 ± 0.31

Adapted from J Cataract Refract Surg. 2022;48(11):1292-1296.

Table 1. Simulated ICL size based on the preoperative corneal diameter measurements provided by the 3 optical biometers

ICL size (mm)	12.1	12.6	13.2	13.7
Aladdin	0	12	34	8
IOLMaster 700	0	2	31	21
Pentacam AXL Wave	0	4	32	18
CAIOS	0	10	27	17

Adapted from J Cataract Refract Surg. 2022;48(11):1292-1296.

CONCLUSIONS

- CD measurements by the 3 devices lead to similar percentages of eyes with an ICL size equal to the OIS.

CONGRESS PRESENTATIONS AND POSTERS

Inter-eye asymmetry in corneal topography and classification of corneal astigmatism

Milhic K, Hull C, Nagra M, Huntjens B. Inter-eye asymmetry in corneal topography and classification of corneal astigmatism. Investigative Ophthalmology & Visual Science. 2020;61:4749. [abstract].

Agreement in anterior eye measurements between the Aladdin biometer and Medmont E300 topographer

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Comparison of horizontal corneal diameter measurements using the Aladdin biometer and Medmont E300 corneal topographer

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