Unique Biometric Benefits of the ARGOS® Optical Biometer

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INTRODUCTION

The SS-OCT technology is the latest generation of ocular biometers to measure ocular dimensions. The technology provides a longitudinal cross-sectional overview of the entire length of the eye. In this article, the unique benefits of the ARGOS® SS-OCT biometer are summarized.

FAST MEASUREMENTS

With increasing rates in cataract surgery globally,[1] it is more and more important to evaluate the patient's ocular biometry in a comprehensive, yet efficient, cataract workflow in the clinic. The ARGOS® biometer measures dense and non-dense cataracts in a fast manner as shown by a recent study investigating the acquisition time of various optical biometers.[2] Specifically, the authors evaluated ARGOS®, Lenstar LS 900 (optical low-coherence reflectometry, OLCR), IOLMaster 500 (partial coherence interferometry, PCI), and

TABLE 1. ACQUISITION TIMES OF 4 BIOMETERS[2]

Biometer	Dense Cataracts			Non-dense Cataracts		
	n	Acquisition time (min ± SD)	P-value vs ARGOS®	n	Acquisition time (min ± SD)	P-value vs ARGOS®
ARGOS®	91	1.08 ± 0.36	-	117	0.96 ± 0.21	-
Lenstar LS 900	91	1.68 ± 0.40	<0.05	117	1.52 ± 0.41	<0.05
IOLMaster 500	90	1.74 ± 0.49	<0.05	98	1.68 ± 0.37	<0.05
IOLMaster 700	90	1.32 ± 0.41	<0.05	98	1.16 ± 0.27	<0.05

aData derived from Multack, Pan, Timmons, et al.[2(p7 Table 2)]

TABLE 2. ACQUISITION RATES OF AVAILABLE BIOMETERS

References	n eyes	ARGOS® (SS-OCT)	IOLMaster700 (SS-OCT)	OA-2000 (SS-OCLR)	Lenstar (OLCR)	IOLMaster v5/ IOLMaster500 (PCI)
		Acquisition rate	Acquisition rate	Acquisition rate	Acquisition rate	Acquisition rate
Shammas *JCRS* 2016[6]	56	96%	-	-	79%	77%
Higashiyama *PLoS One* 2018[7]	55	98.2%	-	-	-	87.3% (v5)
An *BMC Ophthalmol* 2019[8]	431	97.68%	-	-	-	84.69% (v5.4)
Huang *JRS* 2019[9]	171	99.42%	97.08%	97.08%	-	80.70% (v5.4)
Tamaoki *Ophthalmic Res* 2019[10]	622 (all eyes)	97.6%*	92.6%*	96.3%*	-	-
	99 (Grade IV or higher cataract)	89.9%*	63.6%*	80.8%*	-	-
Yang *PLoS One* 2019[11]	146	97.9%	97.9%	-	-	88.4%
Cummings *Clin Ophthalmol* 2020[12]	299	100%	-	-	98.3%	-
Tamaoki *Ophthalmic Res* 2021[5]	1,969 (all eyes)	95.6%**	94.1%**	-	-	-
	213 (Grade IV or higher cataract)	93.4%**	61.5%**	-	-	-
Romanek *Cesk Slov Oftalmol* 2021[13]	106	100%	99.1%	-	-	-
Multack *Clin Opthalmol* 2023[2]	188 (all eyes)	100%	97.3%	-	94.7%	85.1%
	90 (Grade III or higher cataract)	100%	94.4%	-	90%	74.4%

SS-OCT – swept-source optical coherence tomography; OCLR – optical low-coherence reflectometer; PCI – partial coherence interferometry
*ARGOS® and OA-2000 had significantly higher acquisition rates than IOLMaster 700 (p<0.01)
** ARGOS® had significantly higher higher acquisition rates than IOLMaster 700 (p<0.05)
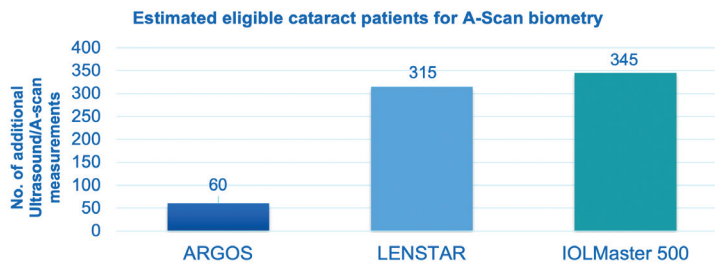
Figure 1. Potential number of additional ultrasound biometry/A-Scan performed annually with different optical biometers in a practice setting that operates on a patient mix with moderate and advanced cataract (n=1,500).[14]
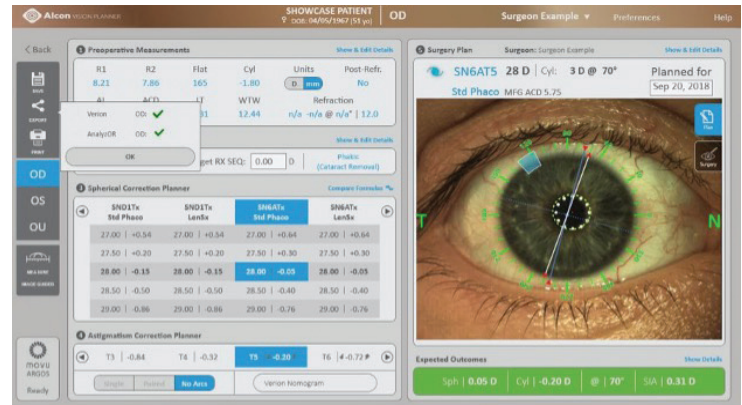

Figure 2. The Alcon Vision Planner provides a quick overview of multiple formulas, IOL options and astigmatic corrections.

IOLMaster 700 (SS-OCT). The time to obtain measurements with ARGOS® for either dense and non-dense cataracts was significantly shorter as compared to the other evaluated biometers (Table 1).[2]

ACQUISITION RATES

Optical penetration of dense cataracts can be challenging and applanation A-scan ultrasound may be used to measure the axial length of a patient.[3] When using applanation A-scan ultrasound, one encounters a larger variability in axial length measurements and prediction error as compared to optical biometers.[4]

While SS-OCT imaging allows for better penetration of denser cataracts, ARGOS® improves penetration even further with the enhanced retinal visualization (ERV) mode.[15] This unique mode improves the overall acquisition rates (Table 2) and reduces the need for applanation A-scans.[14] Comparative studies showed that ARGOS® has the highest acquisition rates among tested optical biometers (Table 2). The improved acquisition capability becomes even more apparent in dense cataracts for which up to 100% of the axial length could be captured with ARGOS® (Table 2).[2,5,10]

An improved acquisition rate reduces the need for applanation ultrasound biometry supporting the efficiency of the clinic. In an economic budget impact model comparing the acquisition failure rates and need for ultrasound biometry, it was shown that using the ARGOS® biometer could result in substantially fewer measurements with ultrasound biometry (Figure 1).[14] Additionally, time and cost efficiencies were identified as potential benefits.[14]

ALCON VISION PLANNER SOFTWARE

Another feature of the ARGOS® SS-OCT biometer is the Alcon Vision Planner that allows for surgical planning directly at the system or on any other networked device. The ARGOS® measurements feed automatically into the surgical plan. The software allows for a quick review of multiple formulas, IOLs, as well as astigmatic management options (Figure 2).[15] Once the surgical plan has been finalized, it can be printed or exported to other Alcon systems.

After surgery, the software can support refractive outcome optimization, including optimization of the SIA by measuring postoperative keratometry and optimization of the A-constant by entering subjective refractions (sharable with the AnalyzOR™).[15]

CONCLUSIONS

The ARGOS® SS-OCT biometer offers several benefits including fast measurements in patients with dense and non-dense cataracts and the highest acquisition rates among optical biometers, particularly for dense cataracts.[2,5,10] Improved acquisition rates of the ARGOS® biometer reduce the need for ultrasound biometry and the integrated Alcon Vision Planner provides convenient surgical planning directly at the device or at any other networked computer.[14,15] ∎

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