

Optimizing surgical outcomes and increasing cataract workflow efficiency with advanced technology.

By Ramón Ruiz-Mesa, MD

Achieving success in cataract surgery depends on a number of preoperative, intraoperative, and postoperative factors. Preoperatively, evaluation of corneal topography and the acquisition of accurate biometric measurements is fundamental for proper surgical planning and choosing the IOL power that will achieve the targeted refractive outcome. Intraoperatively, completing cataract removal efficiently while maintaining anterior chamber stability favors early and optimal visual recovery by minimizing exposure to ultrasound energy and risk of complications. Achieving and maintaining quality visual outcomes for patients also depends on IOL choice.

Using advanced technology for cataract surgery from ZEISS allows me to achieve these goals and with added benefits of improving workflow efficiency.

Accurate and efficient preoperative evaluation

The IOLMaster® 700 (Carl Zeiss Meditec AG, Jena, Germany) provides critical information for cataract surgery planning, and it does so with a single fast measurement that enhances workflow efficiency. Using swept source optical coherence tomography (SS-OCT) and telecentric keratometry, the IOLMaster 700 measures both anterior and posterior corneal curvatures and uses the information to generate Central Topography and Total Keratometry (TK®) in addition to routine biometric data that are used for IOL power calculation.

Time (seconds)	IOLMaster 700 with CT	IOLMaster 700 + Cassini	IOLMaster 700 + Pentacam HR	p-value
Mean ± SD	19.63 ± 5.02	62.94 ± 15.75	53.27 ± 22.72	<0.001**
Range	[11.88, 40.60]	[31.28, 115.73]	[31.09, 177.94]	

CT: central topography; SD: standard deviation; p-value was obtained with the ANOVAtest. ** significant differences <0.05

Table 1. Mean acquisition times for the different devices

The Central Topography feature creates anterior and total axial power maps covering the central approximately 4 mm of the cornea. This visually relevant area is critical to assess when planning cataract surgery because corneal irregularities in the central 4 mm zone are important to consider for decisions on toric, multifocal, or extended depth-of-focus (EDoF) IOL implantation. Using the IOLMaster 700 with Central Topography gives surgeons initial insight on any corneal asymmetries that can affect IOL selection¹ and does so without

the need for additional hardware, change in workflow, or increased chair time.

A study by Dr. Douglas Koch and colleagues at Baylor College of Medicine in Houston, TX, USA, compared the Central Topography maps created by the IOLMaster 700 to those obtained with a dual Placido disk-Scheimpflug tomography unit (Galilei G4, Ziemer Ophthalmic Systems) (Figure 1).¹ Of clinical importance, the researchers concluded that Central Topography provided similar overall shape and comparable symmetries in most cases. The same decision was made whether to recommend a premium IOL based on Central Topography and the Placido Disk-Scheimpflug device in 75% to 97% of cases.

The TK measurement provided by the IOLMaster 700 is another valuable feature because of its potential to improve the accuracy of IOL power calculations. Direct measurement of the posterior corneal surface to determine total corneal power is particularly valuable for choosing the correct IOL power in postrefractive surgery eyes and in cases involving toric IOL implantation.^{2,3} However, the vast majority of cataract surgery patients do not fall into these categories and receive a non-toric monofocal IOL.⁴ Variation in the anterior/posterior corneal curvature ratio exists within the normal population, and these outliers are at risk for clinically relevant IOL power miscalculation errors.⁵ This information underscores the value of using the TK measurement routinely for IOL power calculations.

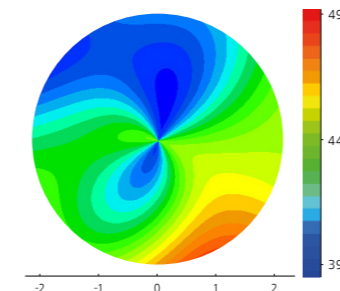
The TK value can be used in either classic IOL power calculation formulas (such as Haigis) or formulas specifically developed to incorporate TK, such as the Barrett TK Universal II. Findings from clinical studies investigating IOL power calculation using TK and other biometric measurements from the IOLMaster 700 show that it results in refractive accuracy that is as good as or better than methods that rely on assumptions or nomograms to adjust for the posterior cornea.^{6,7}

Enhancing efficiency

The time needed to perform preoperative testing is an important consideration because of its impact on clinic flow and the patient experience.⁸ Procedures that offer efficiency without sacrificing accuracy certainly offer an advantage in the setting of a busy clinic, and stream-

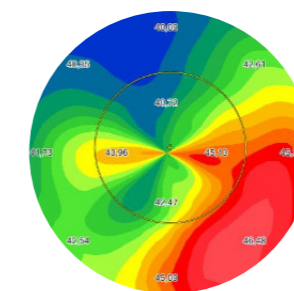
ZEISS IOLMaster 700 anterior axial power map

Step: 0.5 D



ø approx. 4 mm

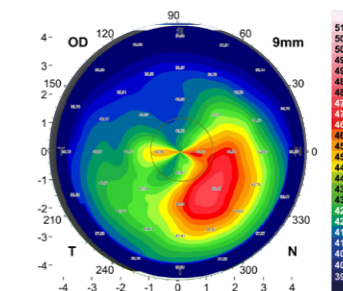
Dual-Scheimpflug/Placido device anterior axial power map



ø approx. 4 mm

Dual-Scheimpflug/Placido device anterior axial power map

Step: 0.5 D



ø approx. 9 mm

Figure 1. Comparison of IOLMaster 700 with Central Topography maps to 4 mm and 9 mm maps from a dual Placido-disk Scheimpflug tomographer, in a case of Pellucid Marginal Degeneration. Images courtesy of Giacomo Savini, MD

lining patient evaluation has gained importance since the start of the COVID-19 pandemic.

With this issue in mind, we undertook a prospective study to compare the acquisition times using the IOLMaster 700 with Central Topography, the IOLMaster 700 + the Pentacam® HR (Oculus, Wetzlar, Germany), and the IOLMaster 700 + the Cassini® (Cassini Technologies B.V, Den Haag, The Netherlands).* The measurement protocols were done in random order by a skilled technician in 100 eyes of 100 patients undergoing cataract surgery.

We found that overall, the mean acquisition time was approximately 20 seconds when using the IOLMaster 700 with or without Central Topography, demonstrating that the data used to generate Central Topography maps is obtained as part of a single standard measurement. Using the IOLMaster with a second device to acquire preoperative measurements took approximately 2.5- to 3-fold longer compared to the acquisition times for using the IOLMaster 700 alone. The differences in acquisition times between the protocols were highly statistically significant.

Intraoperative technology

The technology used intraoperatively also affects outcomes of cataract surgery. QUATERA 700, the new phacoemulsification unit from ZEISS, unleashes a completely new experience in phaco. QUATERA 700 provides digitally integrated surgical workflow by connecting your OR-devices for more efficiency. One data access and one sterile cockpit allows you the integration of patient data from IOLMaster and the combination of ZEISS CALLISTO eye workflow steps and phaco steps in one workflow. Control the full surgical workflow from the sterile zone (Phaco steps, ZEISS CALLISTO eye assistance functions, patient data for timeout check, microscope image) means faster anticipation of and reaction to surgical steps and less interaction with other devices. In addition, QUATERA 700

minimizes ultrasound energy by delivering power only when it is needed. It features a new patented pump (QUATTRO Pump®) – a synchronized fluid exchange system with direct control of aspiration and infusion and active incision leakage volume compensation providing chamber stability independent of IOP and flow. Leading to a more relaxed surgery that allows surgeons and their team to focus on the essence and to perform surgery with maximum efficiency from day one.

The majority of patients undergoing cataract surgery receive a non-toric monofocal IOL.⁴ In these cases, choosing the CT LUCIA® 621P IOL (Carl Zeiss Meditec AG) increases my confidence for achieving excellent outcomes and patient satisfaction. The CT LUCIA 621 comes preloaded in a single-use injector system (BLUESERT™) that enables intuitive and efficient delivery. Thanks to its material and design, the CT LUCIA 621 provides high quality vision, has excellent refractive stability and low PCO.

Conclusion

There are many different technologies that can be used in the planning and performance of cataract surgery. To my experiences, the IOLMaster 700 with all its functionalities, such as Central Topography and TK represents an accurate and efficient tool for collecting the preoperative information that is essential for optimizing surgical decision-making and refractive outcomes. Combined with the new QUATERA 700 for phacoemulsification and the CT LUCIA 621 IOL, I feel I am choosing the best technologies the market has to offer.

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* Publication by Dr. Ramón Ruiz-Mesa et al. in progress.