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Cassini Clinical Review

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True Axis: Essential for premium IOL Planning

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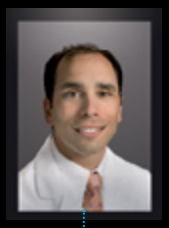

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The challenge of determining the exact axis of astigmatism for cataract surgery

Determining the exact axis of corneal astigmatism during cataract surgery planning can be a challenge due to the measuring limitations of current corneal topographers and keratometers. In addition, the expectations and demands of patients have risen in recent years and the search for perfection has become critical, especially when it comes to astigmatism correction.

Noted toric IOL expert Warren Hill, MD, Medical Director of East Valley Ophthalmology in Mesa, AZ, has described how each degree that a toric IOL is misaligned will results in a loss of 3.3% of correction power. So, even at 5 degrees of misalignment, there is a loss of 16.5% and a larger 10 degrees will equate to a loss of one-third of the toric IOL correction power. At 30 degrees misalignment, there is full loss of toric IOL correction power. The impact of misalignment on vision becomes greater with increasing toric IOL power.

Cassini is ready to play an essential role in your toric IOL planning process. Due to the superb axis precision of less than 3 degrees measured by Cassini, this new color LED patent device could play an essential role in your toric diagnostic platform.

"Cassini offers new insights and opportunities" and is "a better alternative" when it comes to corneal astigmatism axis determination in toric IOL planning, says Douglas D. Koch, MD, Professor of Ophthalmology at Baylor College of Medicine, Houston, TX.

Along with TrueVision's TrueGuide surgical guidance software, Cassini can address data generation and alignment marking errors that can occur during toric IOL planning and implantation. The use of Cassini data and imaging of the eye to address cyclotorsion errors, along with registration of the planned treatment aligned to the live surgical eye provides surgeons with digital precision during premium cataract surgery procedures. The synergy of Cassini diagnostics with intraoperative guidance technology and real-time eye tracking is driving a new approach to address known potential errors in traditional cataract surgery. Cassini data is having a real impact in today's surgical practice.

Experienced Cassini user Jonathon D. Solomon, MD, Medical Director at Solomon Eye Associates, Bowie, MD, maintains that "any procedure that requires accurate axis determination benefits from Cassini's data. Cassini takes the guesswork out of the equation."

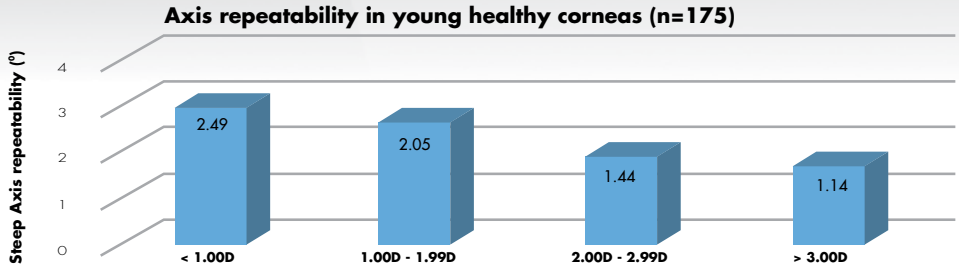
This is an incredibly dynamic time in the evolution of our understanding of the cornea and its optics, as well as how surgeons can use this information for more accurate and safe procedures for patients. Cassini provides an exciting new method of corneal analysis to increase toric IOL use and to ease the planning of surgical astigmatism treatments. Improved data going into the planning process is the key to producing optimal patient outcomes.

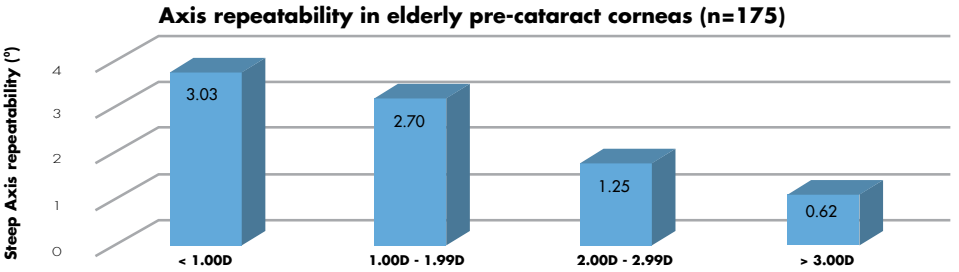
i·optics

Axis repeatability in normal corneas

Cassini has proven to measure the axis of astigmatism within 3 degrees in normal corneas.

Dr. Kanellopoulos (NYU Medical School, New York; Laservision Eye Institute, Athens, Greece)) has evaluated the clinical effects of Cassini and investigated the repeatability of astigmatism measurements in a group of young healthy corneas and a group of elderly pre-cataract corneas.



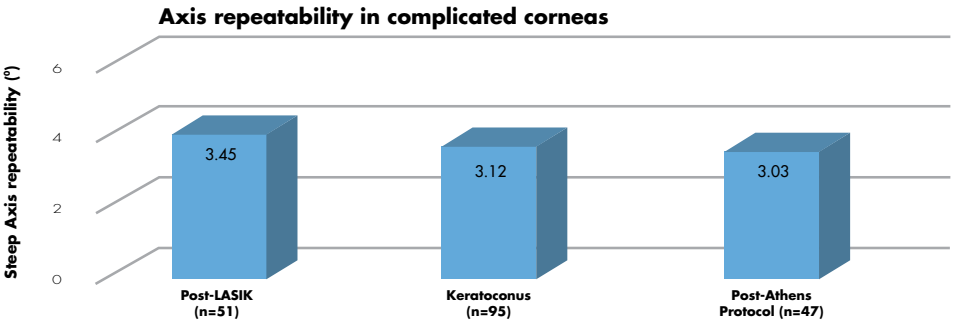


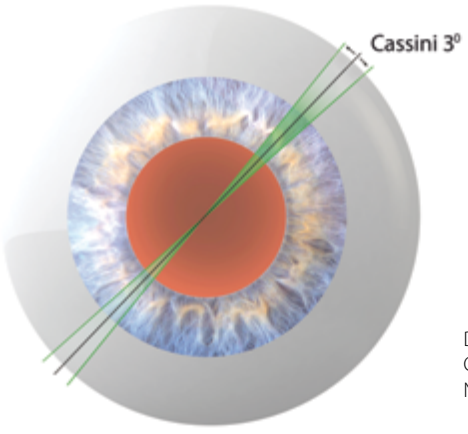
Data courtesy of Dr. A. John Kanellopoulos & Dr. George Asimellis

Axis repeatability in complicated corneas

Cassini has proven to measure highly irregular and complicated corneas, accurately and precisely.

Dr. Kanellopoulos also investigated the repeatability of axis measurements in complicated corneas. The conditions included post-LASIK group, corneas with relatively low astigmatism, keratoconus group, corneas with relatively high astigmatism and *post-Athens Protocol group.



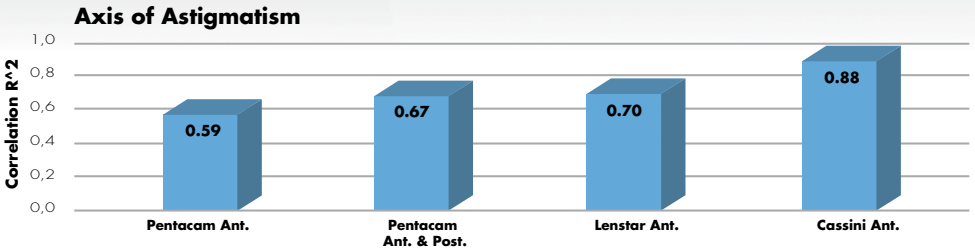


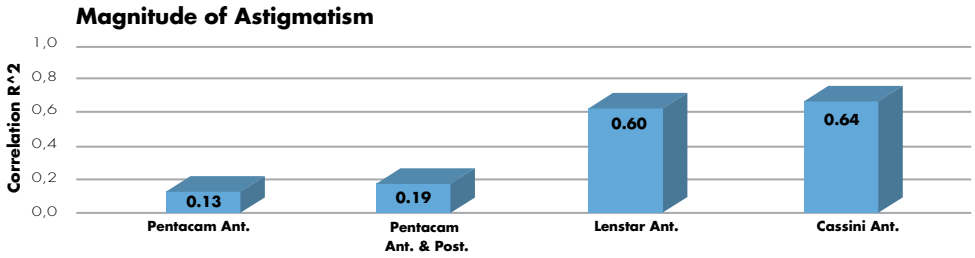
Data courtesy of A. John Kanellopoulos, MD.
Clinical Professor Of Ophthalmology
New York University Medical School

Astigmatism correlation comparison study

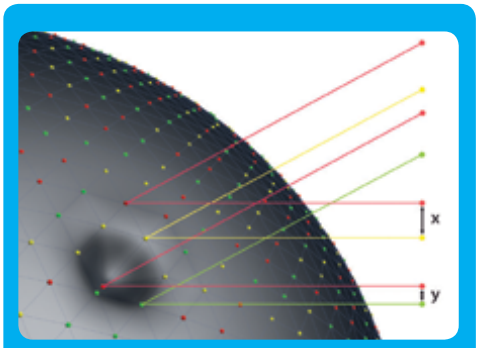
Cassini measurements (corneal axis and magnitude of astigmatism) shows to be significantly closer to the data of the auto-refractor, in comparison with other topographers.

Dr. Arni Sicam (PhD, Rotterdam Eye Institution, The Netherlands) has evaluated the correlation of total cylinder acquired by a Topcon auto-refractor versus the anterior corneal astigmatism (both axis and magnitude) of Cassini, Pentacam and Lenstar LS 900 on 39 Pseudophakic eyes with spherical monofocal IOL's.





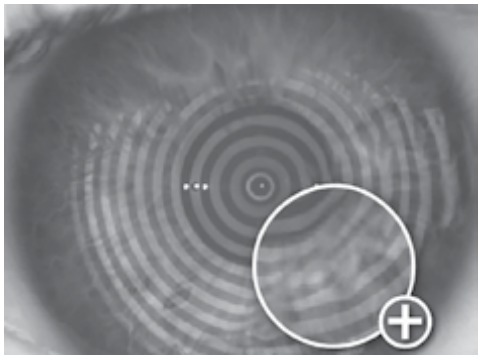
Data courtesy of Dr. Arni Sicam



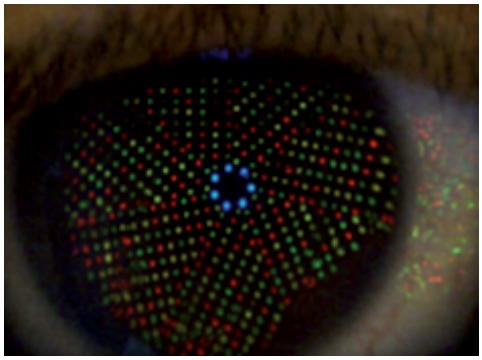
True Technology

Cassini technology employs 679 red, green and yellow LEDs that are each positioned in a unique relationship to all four LED points surrounding it, which gives each one an unmistakable 'coordinate'. Cassini uses the Ray-Tracing principle to measure the position of each point in relation to that of its neighbors, using the three different colors as triangulation points. A rise in elevation increases the distance between points and a dip in elevation decreases it. Due to the fact that Cassini does not use edge detection in its measurement algorithms, smeared or doubly reflected LEDs cannot influence the results in any direction. Together, these design principles enable Cassini to shine as a robust analysis device to aid in surgical planning.

Accurate measurements regardless of tear film stability

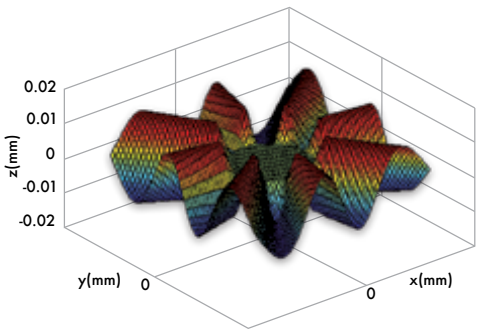


A poor tear film in Placido acquisition can result in melted or distorted rings, which will cause misinterpreted information.



With Cassini's multicolor LED point-to-point measurement technique, virtually all corneas can be measured accurately.

Artificial surface acquisition with an octofoil test target



Octofoil test target

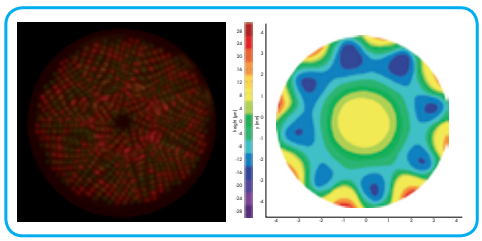


Image reconstructed by Cassini

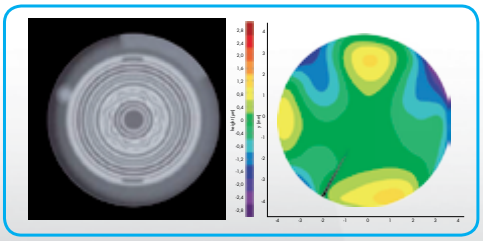


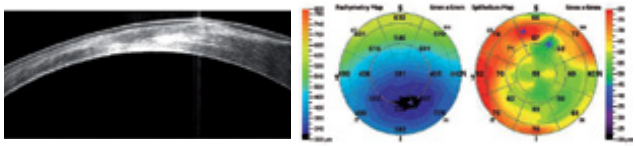
Image reconstructed by a Placido system

The state-of-the-art technology of Cassini demonstrates the accurate and superior results in reconstructing a rotational non-symmetric surface.

Case report: Robust in imaging a highly irregular cornea with Keratitis

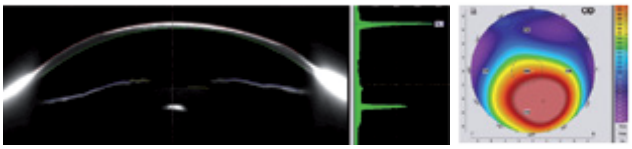
An 18 year old female patient, infected with Acanthamoeba Keratitis in her right (OD) eye approximately two years ago.

Comparison of measurement results between different devices



OCT high resolution meridian (80°) Scan

The OCT successfully shows the deep stromal scars, appearing as an opacity associated with the residual stromal scaring (central corneal thickness and minimum corneal thickness were 381µm and 318µm respectively). A thinner epithelium (56µm) over the thinnest, most elastic region of the cornea.



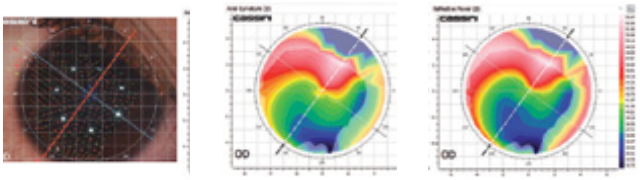
Scheimpflug Scan

As a possible consequence of the corneal opacity, the posterior surface is poorly identified and the lesion may alter the normal densitometry interpolation of the Scheimpflug algorithm. The Scheimpflug imaging derived central and minimum corneal thickness were 438µm and 167µm respectively which was very different from the OCT data.

Placido Ring System Imaging

The Placido imaging shows the highly distorted ring pattern along the vertical direction. The refractive map shows very large variation of the corneal refraction, ranging from a localized 33.50D inferiorly to more than 48.00D superiorly, which was not successful in imaging this case.

Data courtesy of Dr. A. John Kanellopoulos & Dr. George Asimellis



Cassini Scan

Cassini imaging on the affected eye shows both radial and contour differences based on differential spot-imaging enabling proper imaging and accurate measurement of this irregular cornea.

	Cassini Specifications
True Axis	• Multicolor LED imaging technology • Axis repeatability within 3 degrees
True Magnitude	• Diopter range 4.00D – 171.00D • Display K-values per zone • Keratometric indices display in D (diopters) or mm (millimeters)
True Capture	• Auto Capture with joystick positioning • Measurement Quality Factor parameter • Auto pupil detection • Topographic indices - E (shape factor), e (eccentricity), Q (asphericity), p (form factor) • Keratoconus indices - SAI (Surface Asymmetry Index), SRI (Surface Regularity Index)
True Accuracy	• 679 LED lights with 129,000 points analyzed • 10.00mm analysis diameter
True Technology	• Full color Photography • Topographic maps - Axial, Refractive, Tangental, Elevation, Aberrations, Recorded color HD image • Multiple color spectrum options • Incorporated patient management program • USB, Direct print, PDF, JPG, PNG, 3rd party output connectivity • Mesopic and photopic pupillometry

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