

CORNEAL ASTIGMATISM

New method gives more accurate measurement of astigmatism of the whole cornea

by Dermot McGrath

A new method of quantifying corneal topographic astigmatism (CorT) has been shown to correspond better to manifest refractive cylinder than other commonly used measures and could lead to more accurate measurement of corneal astigmatism and ultimately better visual outcomes for patients, according to a recent Australian study.

“Our study showed that when compared to the manifest refraction cylinder, CorT was found to be a better measure of corneal astigmatism than currently used methods such as simulated K, manual K, corneal wavefront or paraxial curvature matching because it is based on more data from a wider area of the cornea,” said Noel Alpíns FRACS, FRCOphth, FACS, lead author of the study with James KY Ong BOptom and George Stamatelatos BScOptom (see *Journal of Cataract & Refractive Surgery* Vol. 38, Issue 11, Pages 1978-1988).

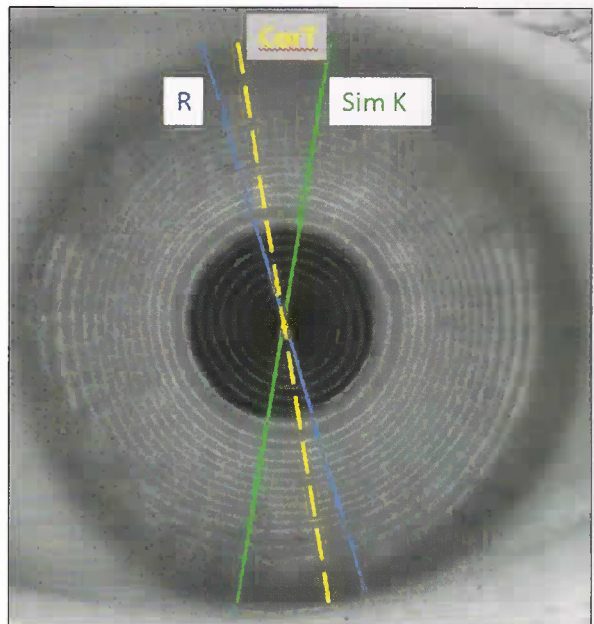
Dr Alpíns noted that using CorT gives a more accurate measurement of astigmatism of the whole cornea or hemidivision of the cornea, as well as the optimal orientation of the incision, ablation, or toric intraocular lens required for that particular eye. Importantly, it also serves to reduce the disparity between different topographers in calculating astigmatism values.

“Corneal irregularity is quantified by several topographers with varied parameters that are not directly comparable to each other. Having corneal topographic astigmatism semi-meridian values with topographic disparity provides us with the ability to standardise corneal irregularity assessment between these different topographers,” he said.

Dr Alpíns’ retrospective study assessed topographic data in 486 virgin right eyes and 485 virgin left eyes of 498 patients (190 men and 308 women; age 19 to 64 years). 12 right eyes and 13 left eyes were excluded because more than 10 per cent of the topographic data was missing from ring 7 due to upper lid interference, which could have led to unreliable simulated K measurements.

For each Placido ring, an astigmatism value was calculated and the ring astigmatism values were combined via vector summation to create a new measure – CorT. This parameter was then assessed against other commonly used measures of corneal astigmatism using the ocular residual astigmatism (ORA) and its standard deviation (SD) on how closely each measure matched manifest refractive cylinder.

While computer-assisted videokeratography provides multiple concentric Placido rings, most of these rings currently do not contribute to quantifying corneal astigmatism as displayed on simulated K, explained Dr Alpíns. “One of the main problems with SimK is that it can come up with a significant amount of variability if it is reading an uneven area of the cornea. By contrast, CorT takes more than just one ring of the topographer. It includes all of them – 22, 24 or 26 depending on the topographer – and then takes an average using a vectorial method. By performing an average, if one reading is an outlier, it will be diluted by all the other readings which are much more



The figure displays the difference in orientation between the corneal astigmatism as measured by Sim K and refractive cylinder (R). The corneal topographic astigmatism (CorT) lines up closer to the refractive cylinder axis than Sim K

accurate. This means that we get a lot less variability and a lot more accuracy with the CorT value,” he told *EuroTimes*.

While this enhanced accuracy works for all types of cornea, Dr Stamatelatos believes that CorT works particularly well for more irregular corneas.

Dr Alpíns said that the study clearly demonstrated that CorT provided less variability and greater accuracy than data obtained with manual keratometry, simulated keratometry, corneal wavefront and paraxial curvature matching.

“That is already significant, but we also found that CorT matches the manifest refractive cylinder closer in magnitude and orientation, not just in the spread of the ORA, than the other measures of corneal astigmatism. The reason we chose manifest refractive cylinder as a benchmark is because it is a measure of the total ocular and perceived cylinder and is also used as the reference in prescribing spectacles and performing excimer laser surgery,” he said.

With the initial study of CorT now published in the *JCRS*, the next step for Dr Alpíns and his co-authors is to disseminate the results as widely as possible and ensure that CorT is integrated into the leading topographers on the market.

“We have been introducing CorT at all the major ophthalmic meetings and will be presenting more information and data about it in the coming months,” said co-author Dr Stamatelatos.

Dr Alpíns and Dr Stamatelatos have a financial interest in the ASSORT[®] outcomes analysis software.