

Heritability of Corneal Shape in Twin Study

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Evaluation of corneal shape has gained momentum in ophthalmology. “Corneal topography,” from Greek words *topos* meaning “to place” (τόπος) and *graphein* (γράφειν) meaning “to write,” has evolved to “tomography,” also from the Greek word *tomos* (τόμος), which denotes “to slice or section.”¹ Corneal tomography refers to the three-dimension (3D) reconstruction of the cornea, providing the characterization of the elevation of the front and back surfaces of the cornea, along with pachymetric mapping.¹

While the heritability of corneal front surface curvature parameters has been found to be 55% on a meta-analysis,² there were no studies to date that evaluated the genetic influences on corneal tomography parameters. In genetic epidemiology, gene-environment interactions are fundamental for understanding the development of some diseases. Studies involving monozygotic (MZ) and dizygotic (DZ) twins serve as models to test the impact from genetic and environmental factors. In keratoconus, there is an important genetic contribution for the pathogenesis of the ectatic disease, but there is also a significant environmental effect on the expression of disease.³ Interestingly, this concept is applied when screening for candidates at risk for progressive keratectasia after laser vision correction (LVC) as this is fundamental to consider either the susceptibility preoperatively, the impact from the procedure, and also from postoperative stress.^{1,4}

Mahroo et al.⁵ studied a cohort of healthy twins, recruited from the TwinsUK registry. Thirty-two MZ and 37 DZ pairs were analyzed by the Pentacam HR (Oculus, Wetzlar, Germany) at the same time of the day. Radius of curvature, elevation at apex, and elevation at thinnest for the front and back surfaces were evaluated along with central (apex) thickness, thinnest point, and thickness progression. Heritability was confirmed for all parameters measured using OpenMx package. However, derived estimates for heritability were higher for posterior elevation parameters, suggesting that the posterior cornea has less influence from the environmental factors.

References

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