

Premium Corneal Ablations With Zyoptix

This system provides both wavefront-guided and wavefront-optimized corrections.

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Conventional excimer laser corneal ablations induce changes in corneal shape and thus corneal asphericity, leading to an increase in higher-order aberrations (HOAs) and degradation of visual performance measures including night vision and contrast sensitivity.¹⁻⁴ The increase in HOAs, particularly fourth-order spherical aberration, is related to several factors that include the amount and type of correction, the ablation profile, the biomechanics of the corneal response, and corneal wound healing.⁵⁻⁹ Premium, or customized, excimer laser corneal ablations typically avoid some of the visual disturbances associated with refractive surgery.

For customized surgery, most excimer laser platforms employ wavefront-guided treatments; another available option is wavefront-optimized treatment. The Zyoptix platform, which combines the Technolas 217 Z100 excimer laser (Technolas Perfect Vision GmbH, Munich, Germany) with the Zyoptix diagnostic workstation (Technolas Perfect Vision GmbH) for wavefront aberration examination and Zylink treatment software, now has the capability to perform either type of custom ablation profile.

Wavefront-guided surgery is a keratorefractive technique that corrects both preexisting lower-order aberrations (LOAs; ie, spherocylindrical error), and corneal HOAs. Conversely, wavefront-optimized laser profiles preserve preexisting ocular aberrations and optimize the asphericity of the cornea. These procedures consider corneal asphericity (Q) in the ablation algorithm. Both wavefront-guided and wavefront-optimized treatments improve visual performance compared with conventional ablation.¹⁰⁻¹⁵

EFFICACY OF THE ZYOPTIX PLATFORM

The Zyoptix platform has been used internationally since 2001, and many surgeons have confirmed the efficacy of its wavefront-guided ablations during PRK and LASIK.¹⁶⁻²¹ The Technolas 217 Z100 is a flying-spot excimer laser that uses truncated Gaussian spots of 2- and 1-mm diameter for the correction of LOAs and HOAs, respectively, in the Zyoptix procedure. The

TAKE-HOME MESSAGE

- The Zyoptix platform is capable of producing either wavefront-guided or wavefront-optimized ablations.
- The Zywave aberrometer creates a personalized ablation profile to correct LOAs and HOAs.

Zywave aberrometer creates a personalized ablation profile that corrects preexisting HOAs and LOAs.

Zyoptix wavefront-guided ablations demonstrated less increase in postoperative HOAs compared with standard ablation in several studies.¹⁶⁻¹⁸ In our own study, PRK with the Zyoptix wavefront-guided platform was related to less increase of root mean square (RMS) of total HOAs. We suspect this is related to the tissue-saving effect of the wavefront-guided ablation software. Moreover, we observed a reduction of preoperative third-order coma aberrations, predominantly in the physiologic corneal wavefront error, and particularly for higher preoperative values, related to the ablation profile calculated from wavefront measurement.¹⁹

More recently, additional algorithms have become available for the Zyoptix system. These allow aspheric ablation patterns as well as combined aspheric and wavefront patterns. The aspheric algorithm has demonstrated greater efficacy in reducing induced spherical aberration and preserving corneal asphericity compared with conventional and wavefront-guided ablations.^{20,21} The combined aspheric and wavefront algorithm showed good correction of LOAs and HOAs with no induction of spherical aberration and with improvement in quality of vision.²²

CONCLUSION

The Zyoptix system performs both wavefront-guided and wavefront-optimized treatments, and clinical results confirm the efficacy of both techniques. In my experience, the wavefront-guided ablation algorithm is particularly useful in eyes with higher preoperative RMS values, and the aspheric ablation is essential to maintain corneal asphericity and provide optimal vision.

Randomized studies comparing algorithms for the Zyoptix and other laser systems would be useful to enable us to understand the individual contribution of wavefront-guided and wavefront-optimized laser ablations. It would also help to identify patients suitable for different treatment options and those who would benefit from a combined wavefront-optimized treatment. ■

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