

# REFLECTIONS ON REFRACTIVE SURGERY

By *Olivia Serdarevic*



## Customised Ablation Should it be called Wavefront Guided?

There have been ongoing advances on customised corneal laser recontouring, resulting in less induced optical aberration. The main sources for the continuing improvement in refractive and functional results are the same ones I wrote about in this column in November 2002 – “refined nomograms, better contour profiles, enlarged optical and blend zones, corneal tissue sparing and more accurate tracking and centration – and not wavefront”.

Wavefront technology has been the most useful for diagnostic purposes – not treatment. Improvements in the application of wavefront technology have increased our diagnostic capabilities and have allowed us to better understand and evaluate the optical effects of our laser treatments.

Aberrometers are evolving with higher dynamic ranges and higher spatial resolution. Aberrometry measurements need to differentiate contributions from various parts of the eye. Simultaneous measurement of corneal curvatures and optical aberrations is advantageous.

Diagnostic instrumentation to analyse how optical aberrations are processed centrally in each patient is not yet available. This type of analysis

will be necessary to gauge neural summation and neuroplasticity – which varies from patient to patient but is known to be markedly reduced after childhood.

Paul-Rolf Preussner M.D. of Mainz, Germany

recently quantified the limits of the wavefront approach for correction of optical errors of the human eye. He compared optical path length difference (wavefronts) and refractive errors (angular deviation of rays). He demonstrated that “wavefront errors determined preoperatively cannot be used for optimisation of the optical quality if the surgical procedure covers a range of many (5-10) dioptres in defocusing power. Approximation of the wavefront error by a Zernicke polynomial series induces additional errors”. Dr Preussner concluded that “the poorer the visual function of a patient’s eye, the less it can benefit from corrections calculated using the wavefront approach.”

Wavefront technology was developed for devices of much higher accuracy than the human eye. This technology has been very useful for adjustments of the optical surface by telescopes by adaptive circuits.

Wavefront technology can be used to analyse the optics of the eye but cannot be “used to maintain the physiology of the cornea” and should not be the only guide for laser ablation.