

An Australian Approach to Modulating Corneal Healing in PRK

By Ann Westmore

NICE - The healing properties of the human cornea are among the body's most precise. After a scratch or more serious wound, the normal response is a prompt regrowth of corneal epithelium to ensure a mirror smooth surface.

For patients undergoing refractive surgery to reduce myopia and/or astigmatism, repair of corneal irregularities produced with excimer laser technology is precisely what is not wanted. The question then becomes, how do you stop the normal healing process so that the surgically altered corneal curvature is maintained?

In early 1992 ophthalmologists in Melbourne, Australia, were among the first to start experimenting with multizone photorefractive keratectomy (MZ-PRK) reasoning that if surgical techniques were modified to minimise abrupt changes in corneal curvature then this would lessen the repair response.

Since then they have treated hundreds of patients with the VisX 20/20B laser, using one of three algorithms, each having a maximum ablation zone of 6mm but differing in the number of zones employed. The Melbourne multizone technique divided myopia correction into a maximum of three ablation zones of differing size but equal dioptric correction. Most recently, the group has tested the technique which divided myopia treatment up to a maximum of six zones of different size with equal dioptric correction in each zone employed.

The Alpines Paradigm

Melbourne ophthalmologist, Dr. Noel Alpines FRACO FRACOPhth FACS, told the *European Society of Cataract and Refractive Surgeons* meeting in Nice that the principle features of the paradigm were that no more than three dioptres were treated in a zone and no more than two dioptres in a pass.

"The dioptric correction within all zones and passes are equalised and astigmatism is preferentially treated in the outer zones," he said. "By equalising astigmatism treatment between zones, the treatment ellipses are concentric providing a smoother transition between the astigmatic treatment zones."

Dr Alpines said that among 585 patients (780 eyes) whose progress after PRK was monitored for a minimum of six months, results generally reflected the number of zones employed. At six months all three techniques appeared efficacious in treating myopia, but there were some demonstrable improvements in efficacy when more zones were used.

"This comparative study confirmed the benefit of equality of dioptric treatment for each zone and improvement in results when using the Alpines technique compared to an alternative approach of having a greater proportion of refractive correction in the inner zones," he added.

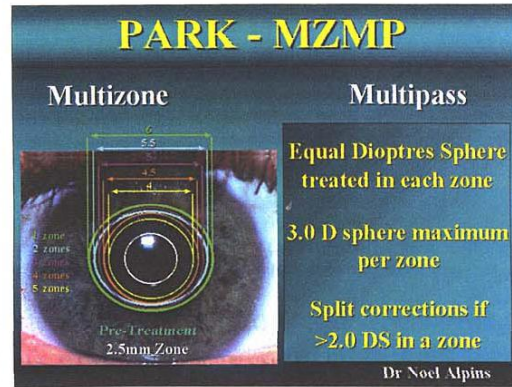
Collaborator in the research, Professor Hugh Taylor MD FRACO, told *EuroTimes* that the extent of desired change in corneal curvature influenced the choice about the number of zones. "We prefer to have a zone for each one to two dioptres," he said. "The surgery on a patient with high myopia therefore will involve more zones."

Implications for clinical practice

included a marginally longer time for surgery, as breaks of 10-15 seconds were needed to re-programme the laser. This also allowed for the very beneficial dissipation of heat between zones.

Less Heat, More Benefit

Professor Taylor, head of the Centre for Eye Research Australia at the University of



Courtesy Noel Alpines, MD

Melbourne, told *EuroTimes* that the intermittent laser treatment approach seemed to be producing some unforeseen benefits. Patients and doctors appreciated the opportunity to catch their breaths while the heat dissipated, he said. In addition there may be less damage to the corneal tissue.

He explained that whatever the number of zones used, the total time the eye was exposed to laser treatment was the same. However with a multizone technique, the time was broken down into smaller parcels and this seemed to provide the cornea with some protection from damage during the procedure.