

Femtosecond laser expands surgery options

Eye Institute installed New Zealand's latest advance in femtosecond laser technology, the iFS IntraLase, in June. In addition to novel improvements in the safety of LASIK corneal flaps, it is the first femtosecond laser in New Zealand that is ready to be used for advanced corneal transplantation techniques, so called 'IntraLase Enabled Keratoplasty' (IEK).

Drs Trevor Gray, Peter Ring, Adam Watson and Professor Charles McGhee, plan to offer IEK to appropriate candidates.

"The use of femtosecond lasers to create novel and complex corneal transplant wound designs is one of the most significant recent technological advances to impact corneal transplantation," said Dr Gray.

"Femtosecond lasers are ushering in a whole new era in corneal surgery," said Dr Ring. "These highly precise lasers have already proven their role in better outcomes when used to create LASIK flaps, now this precision is being applied to full-thickness and partial thickness corneal transplantation."

Traditional corneal transplantation techniques involve various types of hand-held circular metal trephines. These hand-crafted corneal incisions create challenges that ultimately effect visual outcomes such as mismatched donor and recipient incision contours and sizing.

"The femtosecond laser allows surgeons to consider any imaginable incision shape and to precisely match donor and recipient corneal dimensions," explains Professor McGhee.

Many corneal transplant incision designs have been considered, the most popular femtosecond laser-assisted penetrating keratoplasty incision designs have been the 'zigzag' which is Z shaped, the 'top hat' which is more like a drain plug and the 'mushroom', like an inverted top hat.

"IEK offers several advantages over traditional hand-held trephine corneal incisions," said Dr Adam Watson, and further explains:

- Huge increase in surface area available for wound healing. Greater wound strength, faster healing, less risk of wound dehiscence
- Incision designs assist in wound alignment to promote an improved corneal surface profile
- More accurate suture placement by laser-etching of donor and recipient suture spacing
- Improved wound healing has been demonstrated
- Earlier removal of sutures offers faster recovery of vision. Investigators have been

able to remove sutures in half the time that it usually takes of PK wounds to heal

- Potential for less astigmatism
- Potential for less higher order aberrations

In addition to these femtosecond laser-assisted corneal

transplant wound designs, Dr Tony Morris advises that the new iFS IntraLase can be used to create precise arcuate keratotomies for the reduction of astigmatism.

"A further important use of the iFS IntraLase is the creation of very precise intrastromal arcuate incisions, IntraLase Enabled Astigmatic Keratotomy, thus providing a means of correcting astigmatism. This is safe and convenient for patients," he said.

Dr Morris has performed 10 of these procedures and is developing a suitable nomogram. Improvement in vision has occurred in all the patients treated to date.

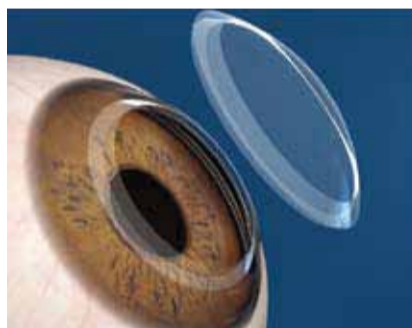
The iFS IntraLase is likely to increase its role in corneal surgery as further applications are developed to further utilise this amazingly precise and safe laser technology. [1](#)



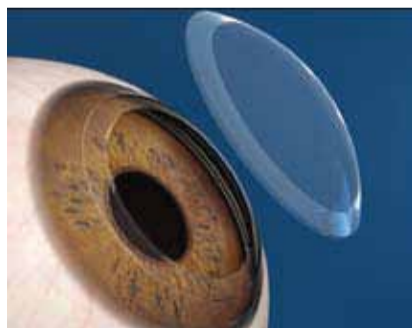
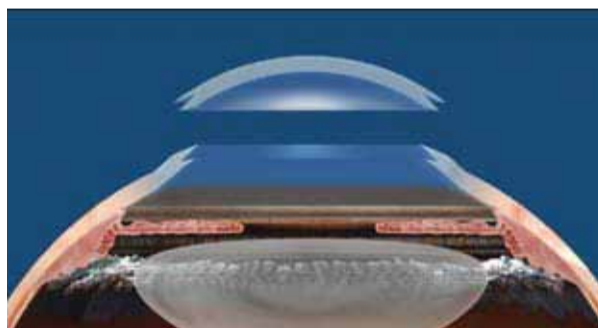
Dr Trevor Gray



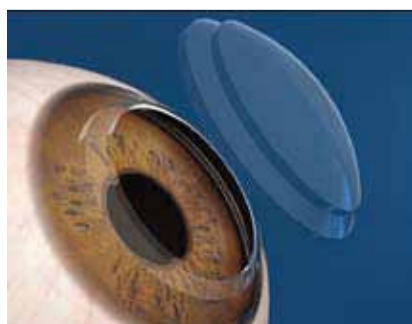
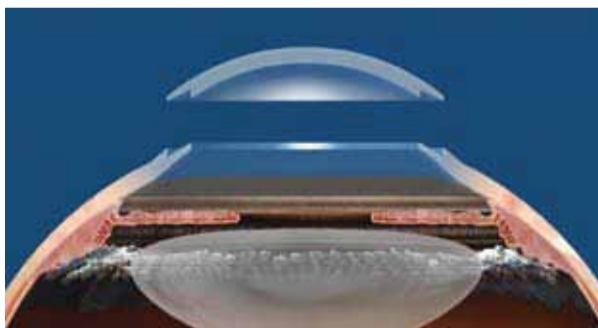
An OCT image of a 'zigzag' incision



The 'zigzag' incision design



The 'mushroom' incision design, shaped like an inverted top hat



The 'top hat' incision design, shaped like a drain plug

