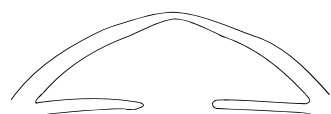


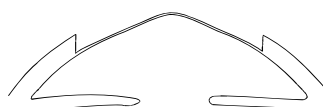
Deep Anterior Lamellar Keratoplasty (DALK): a partial-thickness graft using freeze-dried corneal tissue

What is DALK?

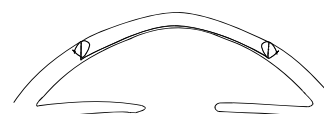
Some corneal conditions such as keratoconus, and corneal scarring following corneal ulceration, primarily affect the corneal stroma. As such, it is this layer that needs to be replaced surgically. In DALK, a circular portion of the central part of the diseased cornea is cut out to a depth of about 95%. This leaves the patient's inner endothelial cell layer and Descemet's membrane still in place.



In keratoconus the cornea is thin and irregular.



The central epithelium and stroma are removed.



The graft is sutured in place.

How is the donor corneal tissue prepared?

To avoid transmission of infection, a corneal donor's medical history is checked to exclude conditions including rabies, Creutzfeld-Jacob disease (CJD), and diseases of the nervous system of unknown cause. Enquiries are made about possible exposure to the AIDS virus, and the donor's blood is tested for HIV, hepatitis B and C, and syphilis. However, because of the potential risk of disease transmission, corneal transplant recipients are no longer able to be blood or organ donors.

Corneas are prepared in the eye bank by having their epithelium, endothelium, and Descemet's membrane removed, and being cut to size. The stromal tissue 'lenticule' is then preserved by freeze-drying. This process kills the keratocytes (cells in the stroma), so there are no living cells in the graft tissue, and for this reason freeze-dried tissue is completely free from problems of graft rejection.

How is DALK performed?

The surgical procedure of DALK is technically exacting and takes around one and a half hours to perform, so is usually carried out under general anaesthesia. However when general anaesthesia is undesirable because of other medical conditions, local anaesthesia can be employed.

When the diseased corneal tissue has been removed, the donor tissue lenticule is re-hydrated and fixed in place, the eye lids are closed with a temporary suture, and then covered with a pad and shield.

What complications can arise at the time of surgery?

One of the commonest complications to occur during the operation is tearing or perforation of the delicate Descemet's membrane and endothelial layer. If this happens, fluid from inside the eye leaks into the graft making it waterlogged and hazy. In most cases the leak stops as the cornea heals, and the final outcome is still good, but very occasionally additional surgery may be required to rectify the problem.

What is the post-operative course?

After the surgery, the eye lids remain closed until the patient's epithelial cells have grown over the graft. This usually takes about four days. The lid suture is then removed, and the eye can then be opened. At this stage the eye will be a little sore, inflamed, watery, and sensitive to light. Steroid and antibiotic ointment is used four times a day, and the plastic shield worn at night for a couple of weeks to protect the graft from being rubbed. After a week or so the eye will be feeling more comfortable, and normal activities and non-strenuous work can be resumed.

The healing process of the cornea is slow, and although the vision is usually improved by 3 months after the operation, further improvement generally takes place from 6 months to a year post-operatively. The surface of the cornea is a major refractive component of the optical system of the eye. Any irregularity in the corneal surface will impair the vision. Because the sutures holding the graft in place may cause distortion of the cornea, it is sometimes necessary to remove them before good vision can be obtained.

What post-operative complications may arise?

If any of the fine sutures that are used to fix the graft work loose, they may cause irritation, and need to be removed after application of local anaesthetic drops. If you do get a loose suture, you should see your surgeon as soon as possible to have the suture removed.

It is necessary to put drops in the eye for at least two or three months to help settle any inflammation following the surgery. Sometimes the epithelial cells are unstable on the graft surface, and if the epithelial cell layer breaks down, it may be necessary to protect it by wearing a temporary bandage soft contact lens for a few weeks.

What is the long-term outcome?

There is almost always a residual optical defect in the eye when the cornea has completely healed, so a spectacle or contact lens will be necessary to obtain the best vision. Alternatively it may be possible to improve the vision by further treatment of the cornea with laser surgery. If there is scarring or opacity between the donor tissue and the patient's cornea, the visual acuity may not be completely restored to normal levels.