



Types of Corneal Transplantation

A corneal transplant involves the removal of damaged tissue from the recipient and replacing it with healthy corneal tissue from a donor. Corneal transplantation is referred to as keratoplasty, where kerato- refers to the cornea (Gk. keras meaning 'horn') and -plasty refers to some kind of surgical modification (Gk. Plasso meaning 'to form').

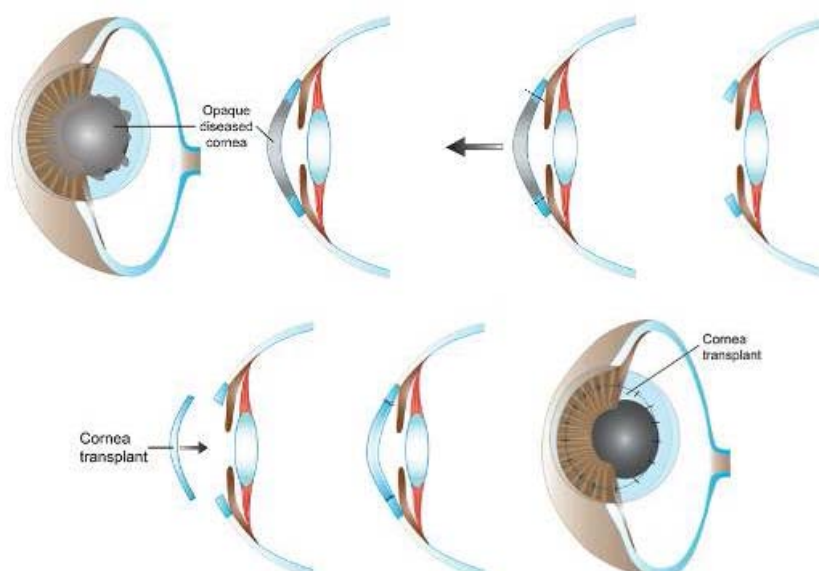
There are three main types of corneal transplant:

1. Penetrating keratoplasty (PK) – a full thickness transplant
2. Anterior Lamellar keratoplasty (LK) – a partial thickness transplant of the front of the cornea (usually 400-450µm thickness)
3. Endothelial keratoplasty (EK) – a partial thickness transplant of the rear of the cornea (usually 85-150µm thickness)

The type of transplant to be performed will dictate the type of cornea (after evaluation by the Eye Bank) that will be suitable for transplant.

Penetrating keratoplasty (PK)

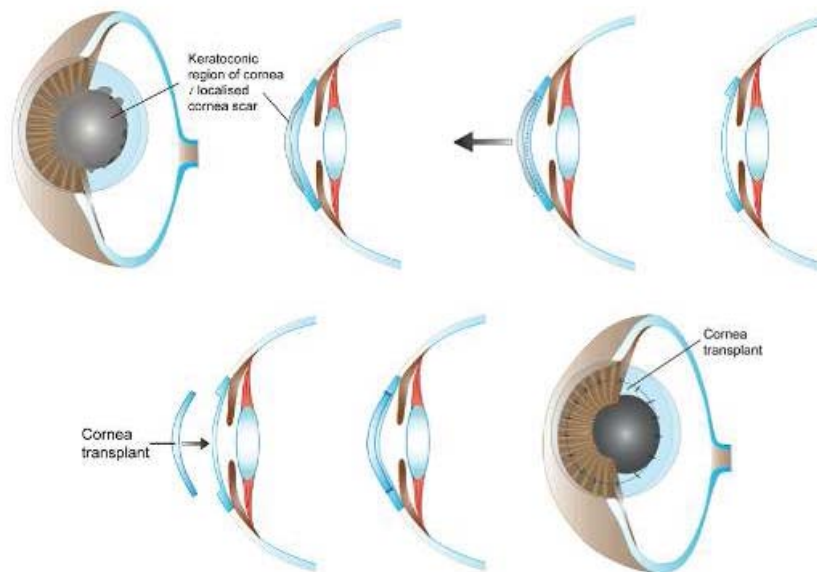
Penetrating keratoplasty was the first method of performing corneal transplantation and remains the most common method. Approximately 80% of all transplants in Australia are still performed this way. A full-thickness 7.0 mm - 8.5 mm diameter button, is transplanted into the recipient's eye with the use of 11.0 microfilament sutures, aided by the use of an operating microscope.



Anterior Lamellar keratoplasty (LK)

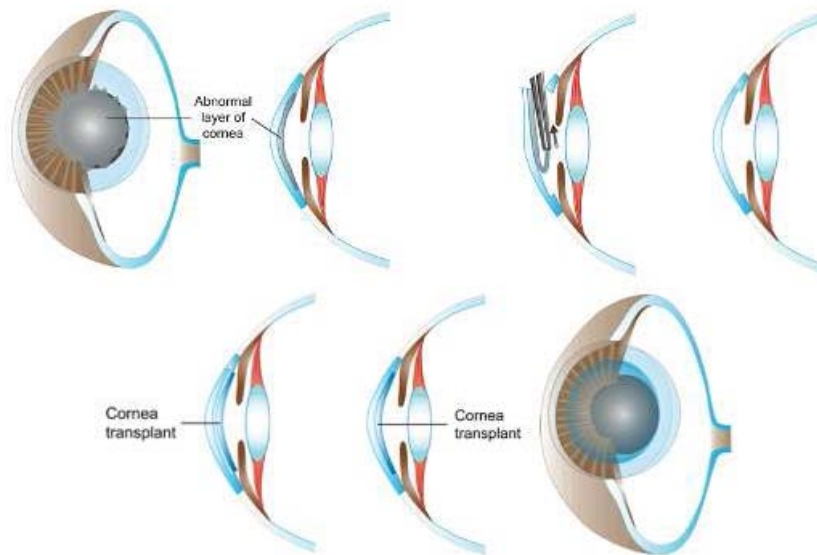
Lamellar keratoplasty is a procedure in which only an anterior layered portion of the recipient's cornea is removed and replaced with the anterior chamber of the cornea remaining intact. The deeper layers of the recipient cornea, in particular the recipient's endothelium, remain intact. A deep anterior lamellar keratoplasty (DALK) replaces both epithelium and stroma with donor tissue.

By not transplanting the posterior endothelial layer of the cornea it is hoped to reduce the risk of rejection of the cornea. It is only suitable for those corneal diseases that involve only the anterior / stromal portion of the cornea.



Endothelial keratoplasty (EK)

Endothelial keratoplasty retains the healthy anterior part of a patient's cornea while replacing their diseased corneal endothelium with healthy donor tissue through a small limbal incision. This is the newest form of transplant and is gaining widespread popularity.



Its advantages compared to standard penetrating keratoplasty (PK) include:

- recipient cornea remains structurally intact and resistant to injury
- no need for sutures
- vision is recovered in a matter of weeks
- visual fluctuations are minimal during the healing process
- preoperative refractive status of the eye is essentially retained

The wound from a penetrating keratoplasty never heals to become as strong as the original cornea. Accordingly, patients who undergo a penetrating keratoplasty are at an increased risk of traumatic injury for the remainder of their lives. Endothelial keratoplasty makes it possible to transplant corneal endothelium through a small incision, similar to that used in cataract surgery, leaving the eye much stronger.

There are a few different types of endothelial keratoplasty:

1. Deep lamellar endothelial keratoplasty (DLEK) or posterior lamellar keratoplasty (PLK) - original technique with excising the posterior recipient stroma and endothelium with small curved scissors and trephine. The donor tissue is folded for insertion through a small incision.
2. Descemet-stripping endothelial keratoplasty (DSEK or DSAEK) - potentially less traumatic to anterior chamber structures than recipient lamellar dissection and tissue excision with trephine and scissors. A mechanical microkeratome

can also be used to simplify the donor tissue dissection with the procedure then called Descemet-stripping automated endothelial keratoplasty (DSAEK). Femtosecond lasers are also being used for donor tissue dissection (FS-DSAEK).

3. Descemets Membrane Endothelial Keratoplasty (DMEK) – whereby only the posterior elastic membrane off the cornea together with its endothelial cells are transplanted. This ensures the thinnest possible lamellar piece is transplanted with the intention of better and faster visual outcomes. This is practiced in Europe but less so elsewhere.