Eye Banking and Corneal Transplantation in New Zealand

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Case Scenario Links

Eye Banking & Corneal Transplantation in New Zealand

- Gradual deterioration in visual acuity over time (Oph07)
“The acquisition, evaluation & supply of high-quality corneal and other tissue to all New Zealanders needing a transplant to restore their sight”
Tissues Supplied

• **Corneas [220 – 250]**
  - Viable, unaltered, sight-restoring
  - Stored in warm organ culture (34°C), up to 21 days

• **Sclera [140 – 160]**
  - Structural, reconstruction
  - Stored refrigerated, up to 6 months

• **Amniotic membrane [15 – 20]**
  - Structural/biological, surface ‘bandage’
  - Stored frozen (-80°C), up to 2 years
Organ donation: heart, liver, kidneys, lungs, pancreas - 50 per year

Tissue donation: corneas, skin, heart valves, bone - many 1000’s per year

Suitable donors identified: by medical staff, transplant coordinators OR referral from families

Next-of kin contacted: information provided about donation, possibility raised, no coercion, if consent given, process explained

Retrieval: careful surgical procedure in hospital, mortuary, funeral home, donor treated with dignity & respect, no delay to funeral arrangements, no visible difference, viewing can occur

Driver’s licence is indication of wish only
Importance of discussion with family/whanau
**Criteria & Contraindications**

**Age:** 10 – 85 years

**Time:** within 24 hours

**Medical contraindications:**
- Death of unknown cause
- Infectious disease: - Hepatitis B,C, HIV, meningitis
- Systemic viral infection
- CNS diseases, progressive dementia
- Leukaemia, lymphoma
- Previous corneal disease or surgery, laser surgery
- Various congenital disorders

**Generally suitable:**
- Cancers
- Heart disease, respiratory disease
- Bacterial infection / septicaemia
- Diabetes, arthritis
- Vision problems or common eye disorders e.g cataract, glaucoma, retinopathy
Donor Source & Suitability

- Coroners: 36%
- Middlemore: 30%
- Other hospitals: 15%
- Multi-organ donors: 8%
- Other source: 11%

Age exclusion:
- Yes consent: 13.6
- No consent: 8.5

Medical exclusion:
- Yes consent: 36.1
- No consent: 30.1

Time exclusion:
- Yes consent: 11.7

Overall:
- 100
Corneal Structure

Cross-section

Endothelial evaluation
## Eras in Eye Banking in NZ

<table>
<thead>
<tr>
<th></th>
<th>Moist pot</th>
<th>K-SOL medium @ 4°C</th>
<th>Culture @ 34°C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1981 - 1987</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Staffing</strong></td>
<td>None - Registrars</td>
<td>Part - time</td>
<td>3 full-time</td>
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<tr>
<td><strong>Donor supply</strong></td>
<td>20 pa</td>
<td>45 pa</td>
<td>100-120 pa</td>
</tr>
<tr>
<td><strong>Donor testing</strong></td>
<td>None</td>
<td>Serology</td>
<td>Routine</td>
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<tr>
<td><strong>Storage time</strong></td>
<td>24 hours</td>
<td>4 - 5 days</td>
<td>21 days</td>
</tr>
<tr>
<td><strong>Quality control</strong></td>
<td>None</td>
<td>Basic</td>
<td>Strict standards</td>
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<tr>
<td><strong>Recipient data</strong></td>
<td>None</td>
<td>Basic</td>
<td>Comprehensive</td>
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<tr>
<td><strong>Corneas grafted</strong></td>
<td>21 pa</td>
<td>50 - 120 pa</td>
<td>&gt;240 pa</td>
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<tr>
<td><strong>Graft survival</strong></td>
<td>68%</td>
<td>Not known</td>
<td>95%</td>
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Eye Bank Operations

24 hour, 7 day, 365 days

- Donor acquisition from mainly Auckland area - within 24 hours
- Links with donor sources: Mortuary, Hospitals, other transplant services
- Donors selected by strict criteria for suitability
- Long-term storage in 34°C culture system - up to 21 days
- Extensive testing for infectious disease & contamination
- Quality control / sterility of highest standard
- Minimum endothelial cell count

- Supply 100% of all transplanted corneas in NZ
- Schedule of planned, elective surgery: 6+ grafts per week
- Reduction of surgical waiting lists
Numbers & Distribution

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<th>Year</th>
<th>Not suitable</th>
<th>Transplanted</th>
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Corneal Transplant

- 6+ cornea bookings per week
- 35 ophthalmic surgeons
- 16 centres

Public hospitals: 75%  
Private hospitals: 25%

Scheduled: ~85%  
Emergency: ~15%
Corneal Transplant

Oldest form of transplant – early 1900’s

Most common form of transplant –
- USA 45,000 pa
- UK 9,000
- NZ 300

Avascular – few rejection problems
- no immunosuppression

12-18 months for optimal vision
Corneal Transplant

Before

After
# Indications for corneal transplant

## Keratoconus
- Acquired abnormality – cornea protrudes, thin & distorted
- Bilateral, progressive, occurs at young age (teens, twenties)
- High prevalence in NZ – 50% of transplants
- Does keratoconus progress more rapidly in NZ? 50%

## Keratopathy/oedema
- Painful epithelial blisters, scarring
- Association with glaucoma & following cataract surgery 18%

## Dystrophy
- Intrinsic genetic disorders, or aging
- Epithelial abrasion/erosion, endothelial cell loss & dysfunction 10%

## Viral or bacterial infection
- Inflammation – opacification – vascularisation - ulcers
- Risk of rejection higher – blood vessels reduces graft tolerance 10%

## Trauma
- Perforation – physical/chemical injury
- Heavy male preponderance 6%
Average: 47.5 years

Male: 52.4%
Female: 42.9%

Keratoconus
Trauma
Regraft
Viral keratitis
corneal oedema

Number

Age (decade)

1st 2nd 3rd 4th 5th 6th 7th 8th 9th 10th
Eye Bank Database

**Eye Bank:**
- Donor characteristics
- Technical & storage details
- Serology/ microbiology tests
- Allocation & distribution

**Recipient Form:**
- Recipient details
- Ophthalmic history
- Surgical & graft procedure
- Post-operative outcome

**Follow-Up Forms:**
[Year 1, Year 2]
- Graft condition & survival
- Visual acuity
- Other ophthalmic procedures

- 180
- 45
- 10
- 235
"The man from the eye bank would like to see you."
The End

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