The Australian Corneal Graft Registry
2020 Annual Report
Overview

- 2020 - Achievements of the ACGR
- Overview of the ACGR database
- Impact of COVID on corneal grafting in Australia
- 2021 ACGR Major Report preview
  - Focus on keratoconus
2020 - Achievements of the ACGR

- 2019 report presented in New Zealand in February 2020
- COVID working arrangements from March to June 2020
  - Administrative staff stayed on-site
  - Research staff worked from home
  - Full functionality maintained throughout
- Individual feedback provided to high volume surgeons
- Preparation for next major report
  - Follow-up request August/September
  - Data entry major push
  - Data cleaning of ACGR database
- Funding renewed for July 2020 to June 2022 period
- Ethics clearance renewed to December 2023
Overview of the ACGR database

- 40,864 Registered grafts
- 31,460 Followed grafts

Database for 2021 Major Report
- Grafts performed up to 31\textsuperscript{st} December 2020
  - Registrations form received by 31\textsuperscript{st} March 2021
- All follow-up received by 31\textsuperscript{st} December 2020
  - Primary Non-Function notified as regrafted by 31\textsuperscript{st} March 2021
Types of Grafts Registered with the Australian Corneal Graft Registry

- Penetrating Keratoplasty (PK)
- Deep Anterior Lamellar Keratoplasty (DALK)
- Descemet’s Stripping Endothelial Keratoplasty (DS(A)EK)
  - Manual (DSEK) or automated dissection (DSAEK)
- Descemet’s Membrane Endothelial Keratoplasty (DMEK)
- Traditional/Tectonic Anterior Lamellar Keratoplasty (TLK)
  - Includes peripheral patch grafts
- Limbal Stem Cell Grafts
# Overview of the ACGR database

## Database as at 31<sup>st</sup> March 2021

<table>
<thead>
<tr>
<th></th>
<th>PK</th>
<th>DS(A)EK</th>
<th>DMEK</th>
<th>DALK</th>
<th>TLK</th>
<th>Limbal</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Registered</strong></td>
<td>26924</td>
<td>6947</td>
<td>3215</td>
<td>2018</td>
<td>1670</td>
<td>90</td>
<td>40864</td>
</tr>
<tr>
<td><strong>Followed</strong></td>
<td>82%</td>
<td>73%</td>
<td>55%</td>
<td>61%</td>
<td>75%</td>
<td>73%</td>
<td>77%</td>
</tr>
<tr>
<td><strong>Failed</strong></td>
<td>25%</td>
<td>21%</td>
<td>18%</td>
<td>8%</td>
<td>21%</td>
<td>34%</td>
<td>23%</td>
</tr>
<tr>
<td><strong>Lost to follow-up</strong></td>
<td>34%</td>
<td>17%</td>
<td>10%</td>
<td>38%</td>
<td>38%</td>
<td>34%</td>
<td>30%</td>
</tr>
<tr>
<td><strong>Died with surviving graft</strong></td>
<td>19%</td>
<td>6%</td>
<td>1%</td>
<td>1%</td>
<td>20%</td>
<td>13%</td>
<td>14%</td>
</tr>
<tr>
<td><strong>Active</strong></td>
<td>22%</td>
<td>56%</td>
<td>71%</td>
<td>53%</td>
<td>21%</td>
<td>18%</td>
<td>33%</td>
</tr>
</tbody>
</table>

Penetrating Keratoplasty (PK), Descemet’s Stripping (Automated) Endothelial Keratoplasty (DS(A)EK), Descemet’s Membrane Endothelial Keratoplasty (DMEK), Deep Anterior Lamellar Keratoplasty (DALK), Traditional Lamellar Keratoplasty (TLK).

*Active grafts are still having follow-up sought by the ACGR. They are not known to have failed, have not been lost to follow-up, and the recipient is not known to have died with a surviving graft.*
Registered Grafts by Graft Type and Year

* The number of grafts registered in 2020 is expected to increase slightly as some registrations may not have been received by the census date of March 31st 2021.
Impact of COVID19 on Corneal Graft Numbers

- Normal variation over year 2015 to 2019
  - Dips tend to coincide with school holidays
- Dip in April 2020 at onset of national lockdowns
- Increased rates in June to October to reduce backlog
- Dip in August/September during Victorian lockdown
Grafts performed for Keratoconus

* The number of grafts registered in 2020 is expected to increase slightly as some registrations may not have been received by the census date of March 31st 2021.
Reduced numbers in younger age groups in last five years
Survival for Keratoconus by Graft Type

Median survival of 23 years and 1 month for PK

No significant difference in survival in past 15 years
**Best Corrected Visual Acuity: 1\textsuperscript{st} Grafts for Keratoconus**

- Pre-graft median BCVA of CF for both groups
- Improves to 6/9 for PK and 6/12 for DALK by 1 year post-graft
- Maintained to 7 years for DALK and 25 years for PK
- Of followed grafts, post-graft
  - 54\% of PK and 41\% of DALK known to wear spectacles
  - 14\% of PK and 8\% of DALK known to wear contact lenses
Keratoconus - Survival of Repeat PK

Median survival

- 23 years 1 month for first grafts
- 13 years 2 months for second grafts
- 9 years 1 month for third grafts
- 8 years 1 month for fourth grafts
- 2 years 5 months for subsequent grafts

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>5</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>25</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>6034 (.98)</td>
<td>2850 (.94)</td>
<td>1556 (.88)</td>
<td>955 (.78)</td>
<td>531 (.62)</td>
<td>253 (.43)</td>
<td>64 (.20)</td>
</tr>
<tr>
<td>Second</td>
<td>1371 (.97)</td>
<td>612 (.81)</td>
<td>233 (.61)</td>
<td>93 (.44)</td>
<td>44 (.30)</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>Third</td>
<td>268 (.93)</td>
<td>104 (.68)</td>
<td>40 (.48)</td>
<td>17</td>
<td>6</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Fourth</td>
<td>84 (.89)</td>
<td>36 (.65)</td>
<td>10</td>
<td>4</td>
<td>2</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Fifth +</td>
<td>47 (.78)</td>
<td>8</td>
<td>1</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>
Keratoconus - Survival of 2nd Graft by Graft Type

- Grafts performed from 2006 (introduction of EK)
- Median survival for EK 3 years and 1 month

<table>
<thead>
<tr>
<th>Trial Time (Years Since Graft)</th>
<th>PK:PK (n=362)</th>
<th>PK:EK (n=184)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 months</td>
<td>122 (.98)</td>
<td>91 (.88)</td>
</tr>
<tr>
<td>6 months</td>
<td>118 (.98)</td>
<td>83 (.84)</td>
</tr>
<tr>
<td>9 months</td>
<td>110 (.98)</td>
<td>79 (.82)</td>
</tr>
<tr>
<td>12 months</td>
<td>100 (.97)</td>
<td>68 (.78)</td>
</tr>
<tr>
<td>18 months</td>
<td>72 (.92)</td>
<td>53 (.76)</td>
</tr>
<tr>
<td>24 months</td>
<td>32 (.84)</td>
<td>38 (.67)</td>
</tr>
<tr>
<td>30 months</td>
<td>14</td>
<td>31 (.61)</td>
</tr>
<tr>
<td>36 months</td>
<td>5</td>
<td>25 (.57)</td>
</tr>
</tbody>
</table>
Keratoconus - History of Collagen Cross Linking

- First grafts for KC
- Grafts since 2012 (case first reported to ACGR)
- Added to ACGR form in 2013
- Increase in recent years of 1st grafts with history of CCXL
  - 2013 to 2017 - Av. 3%
  - 2018 - 5%
  - 2019 - 8%
  - 2020 - 12%

<table>
<thead>
<tr>
<th></th>
<th>3 months</th>
<th>6 months</th>
<th>9 months</th>
<th>12 months</th>
<th>18 months</th>
<th>24 months</th>
<th>30 months</th>
<th>36 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>No known</td>
<td>1331 (.98)</td>
<td>1298 (.97)</td>
<td>1259 (.97)</td>
<td>1186 (.96)</td>
<td>974 (.95)</td>
<td>766 (.94)</td>
<td>604 (.91)</td>
<td>470 (.90)</td>
</tr>
<tr>
<td>Known prior</td>
<td>40 (1.0)</td>
<td>38 (.97)</td>
<td>36 (.95)</td>
<td>35 (.95)</td>
<td>33 (.95)</td>
<td>27 (.95)</td>
<td>21 (.95)</td>
<td>16</td>
</tr>
</tbody>
</table>
Summary of Keratoconus Results

- 2016 to 2020 has seen reductions in first grafts for keratoconus
  - Fewer grafts in recipients under 40 years old
- First PK for KC has a median survival of over 23 years
- No significant differences in survival of PK and DALK
- Visual improvement by 1 year from CF to 6/12 or better
  - Maintained for both groups (up to 25 years for PK)
  - More than half of recipients still wear spectacles or a contact lens
- Survival is reduced in repeat grafts
- Second PK have better survival than EK following first PK
- Comparable survival for eyes with prior Corneal Cross-Linking
Acknowledgments

- DonateLife - The Australian Government Organ and Tissue Authority
- Contributing surgeons, eye banks and follow-up practitioners
- Our team
  - Nora Coffey - Project Officer
  - Vicky Jones - Administrative Officer
  - Miriam Keane - Executive Director
  - Keryn Williams - Scientific Director
  - Richard Mills - Medical Director
  - Cecily Lawson - Administrative Assistant

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2018 report: http://hdl.handle.net/2328/37917