Paired Kidney Exchange Update

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Australian Government
Organ and Tissue Authority
AKX recruitment and match runs

Match run Feb 2011

Enrolled N=39
- NSW: 15
- VIC: 13
- QLD: 4
- SA: 0
- WA: 7

Active N=26
- NSW: 9
- VIC: 11
- QLD: 0
- SA: 0
- WA: 6

Cumulative (enrolled + left program)
2nd Match Run: issues with active pairs

1. High proportion of O recipients.

<table>
<thead>
<tr>
<th>Blood groups</th>
<th>Donors</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>O</td>
<td>A</td>
<td>B</td>
<td>AB</td>
<td></td>
</tr>
<tr>
<td>Recipients</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>69%</td>
</tr>
<tr>
<td>O</td>
<td>5</td>
<td>10</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>4</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>AB</td>
<td>0</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

36%

2. All pairs were sensitised, most pairs had high level of sensitisation (avg cPRA: 65% Class 1 and 46% class 2).

<table>
<thead>
<tr>
<th>cPRA</th>
<th>Class 1</th>
<th>Class 2</th>
<th>Any Class 1 or 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;75%</td>
<td>47%</td>
<td>27%</td>
<td>50%</td>
</tr>
<tr>
<td>&gt;50%</td>
<td>57%</td>
<td>40%</td>
<td>63%</td>
</tr>
</tbody>
</table>
February 2011 Match Run Results

**Match run 2(a), excluding matching if DSA >2000MFI**

NO MATCHES.

→ A second match run was performed using a higher antibody threshold (>8000MFI) to identify further matches.

**Match run 2(b), excluding matching if DSA >8000MFI**

- Several combinations with 2-way and 3-way chains and AD chains.
- In total 12 recipients matched in 6 acceptable combinations.
- The combination with the maximum number of possible transplants matched 9 recipients (5 blood group O, 4 blood group A) and included 1 AD.
- Presence of low-level DSAs (all <2600MFI, except 1x 4900MFI) in 7/12 matched recipients, 4/12 single DSA and 3/12 double DSAs.
- No DSA associated with a previous antigen mismatch.
Rank 1, MP 0.23
Rank 2, MP 0.37
Rank 3, MP 0.41
Rank 4, MP 0.55
Rank 5, MP 0.78
Rank 6, MP 0.85
Pairs required for crossmatch:
### DSA and crossmatch results of pairs matched in the second AKX match run

<table>
<thead>
<tr>
<th>Match ID</th>
<th>Current DSA</th>
<th>Peak DSA</th>
<th>Crossmatch current serum</th>
<th>Released for transplant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Class</td>
<td>Σ MFI</td>
<td>Number</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>n/a</td>
<td>n/a</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>n/a</td>
<td>n/a</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>n/a</td>
<td>n/a</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>I</td>
<td>(1951)</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>I</td>
<td>2331</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>II</td>
<td>3296</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>I</td>
<td>3373</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>II</td>
<td>4937</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>2</td>
<td>I</td>
<td>4942</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>I</td>
<td>5688</td>
<td>2</td>
</tr>
<tr>
<td>11</td>
<td>2</td>
<td>I</td>
<td>9641</td>
<td>3</td>
</tr>
<tr>
<td>12AD</td>
<td>0</td>
<td>n/a</td>
<td>n/a</td>
<td>0</td>
</tr>
</tbody>
</table>

Σ MFI = cumulative MFI, *required DTT treatment for autoantibody
Match ID #4
No DSA >2000MFI, but POS B CELL CROSSMATCH

**HLA typing**
Recipient:  A11,68; B35,51: DR4,15

Donor #1 (Tx 1994):  A11, 33; B35,56; DR4,-
Matched AKX donor:  A*2402,3001; B*0801,1302; DR*0301,0701

**HLA antibodies:**
Current:  A*3303 (6230), A*2901 (5649), A*2902 (3360), A*3101 (2834)
Peak:  A*3002 (7221), A*3001 (2036)

→ Antibodies to A1C CREG include A29, A30, A31, A33.
PKD transplants following match run #2
Combination 866

10 March 2011
Chain 117

6 April 2011
Chain 115

3x O \to O

2x O \to O
1x A \to A
Strength of Luminex DSA and crossmatch positivity

**Single DSA strength**

- CL. I CXM negative
- CL. I CXM positive
- CL. II CXM negative
- CL. II CXM positive

![Box plot showing MFI with p-values](image)

- **P=0.002**
- **P=0.005**

**Cumulative DSA strength**

![Scatter plot showing baseline DSA I and II](image)

Impact of pre-formed DSA in patients with negative CDC crossmatch at the time of transplantation


Irish A, et al. unpublished

Caner Süsal, Jörg Ovens, Khaled Mahmoud, Bernd Döhler, Sabine Scherer, Andrea Ruhenstroth, Thượng Hiền Trần, Andreas Heinold, and Gerhard Opelz

**Strength of individual DSA**

**Patients with graft loss**
MFI Median 2144 (IQR 1577-3463)

**Patients without graft loss**
MFI Median 3933 (IQR 2676-5905)

*Transplantation 2011; epub*
Pitfalls of Luminex SAB testing

Luminex detects:
- non-complement binding IgG2/IgG4 antibodies
- mixture of antibodies against intact and denatured HLA

→ Exclusion based on Luminex alone may reduce the patient’s chance of receiving a donor kidney with acceptable outcome.

A small proportion of patients display alloantibodies specificities to public cross reactive epitope group (CREG) antigens.
- Luminex identifies most, but not all Ab specific for CREG

→ CREG reactivity should be considered to define unacceptable mismatches.
Low match rate in conventional 2-way and 3-way PKD due to:
• High level of sensitisation of enrolled pairs.
• Failure to enrol unsensitised ABOi pairs.
• Excessively stringent HLA antibody allocation.

Solutions to increase match rates:
• Increase DSA threshold for the exclusion of unacceptable antigens?
• Consider ABOi paired exchanges?
• Include unsensitised ABOi pairs?
• Include all altruistic donors?
Single-centre 2½-years experience, San Antonio Texas

1. All incompatible donor-recipient pairs
2. Compatible pairs with donors >45 years of age

64% cross-match incompatibility, 36% ABO incompatibility
83 PKD procedures (22 x 2-way and 13 x 3-way exchanges)

Bingaman C et al., NEJM 2010; 363:1091-1092
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   - **RNSH**: Jason Chan, Justin Vass, Vik Puttaswamy
   - **RPAH**: Melanie Farrer, Richard Allen, Arthur Vasilaras
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