ABO and Rh(D) Chimerism:
If you leave me, can I come too?

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Australian Red Cross Blood Service
Case Study

- SC – 25 year old pregnant female
- Antenatal screen showed mixed field reactions
- Reactions replicated in the RCR laboratory

<table>
<thead>
<tr>
<th>Anti-A</th>
<th>Anti-B</th>
<th>Anti-AB</th>
<th>A1 cells</th>
<th>A2 cells</th>
<th>B cells</th>
<th>O cells</th>
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<tbody>
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<td>2+ mf</td>
<td>4+</td>
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<table>
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<tr>
<th></th>
<th>Anti-C</th>
<th>Anti-D</th>
<th>Anti-E</th>
<th>Anti-c</th>
<th>Anti-e</th>
<th>Rhesus control</th>
<th>2\textsuperscript{nd} anti-D IS</th>
<th>2\textsuperscript{nd} anti-D IAT</th>
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</thead>
<tbody>
<tr>
<td>IS</td>
<td>weak</td>
<td>1+</td>
<td>0</td>
<td>4+</td>
<td>4+</td>
<td>0</td>
<td>1+ wk</td>
<td>2+ mf</td>
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<tr>
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<td>2+ mf</td>
<td>2+ mf</td>
<td>0</td>
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Clinical history

- The patient had not been recently transfused
- There was no history of a bone marrow transplant or haematological disorder
- The patient had not experienced a recent foetol/maternal haemorrhage.
# Density Gradient Separation

<table>
<thead>
<tr>
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<th>Anti-AB</th>
<th>Anti-D</th>
<th>Anti-C</th>
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<th>Anti-Fya</th>
<th>Anti-Fyb</th>
<th>Anti-Jka</th>
<th>Anti-Jkb</th>
<th>Anti-M</th>
<th>Anti-N</th>
<th>Anti-S</th>
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<tr>
<td>SC unagglutinated cells</td>
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<td>1+</td>
<td>3+</td>
<td>3+</td>
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<td>1+</td>
<td>3+</td>
<td>4+</td>
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</table>
Let’s get genotyping

- Samples sent to the Department of Clinical Immunology in Sweden for ABO genotyping
- 4 months later…chimera!
- $ABO^{*}A1.01/O.01.01$ and $ABO^{*}A1.01/B.01$.
- Flow cytometry: 75% of the red cells were lacking B expression, 25% expressed normal levels
What is a chimera?
What is a chimera?

Race and Sanger (1975) divided blood groups into:

- Twin- haemopoietic chimeras which occur in utero
- Artificial- bone marrow or intrauterine transfusion
- Dispermic- two eggs that have been fertilized by two sperm fuse together forming an individual originating from four gametes
What is a twin chimera?

- A blood vessel connection, or anastomosis, is formed between two embryos
- The twins begin to transfuse each other with blood and marrow cells
- Some of the invading cells take root in the marrow of the host
- The host will make cells with both his own genetic pattern and that of his twin for the rest of his life
How would you approach a chimera?

- What blood type would you transfuse?
- Is patient SC a candidate for anti-D prophylaxis?
- Is she acceptable as a blood donor?
References