Resolving ABO Discrepancies

A reminder about assumptions
ABO discrepancies

- 3 CATEGORIES:
  1. Patient cause: either pathological therefore possibly transient, e.g., neoplasms, hypogammaglobulinaemia, IgM alloantibodies; or inherited, e.g., subtypes
  2. Treatment cause: recent transfusion of red cells or plasma; IVIg
  3. Technical cause: laboratory errors, reagent/equipment failure
Resolution process

- investigation of clinical history to exclude treatment causes
- Ensure technically valid and repeatable results
Common causes in our lab

- Missing/low level ABO antibodies
- IgM alloantibodies (we see anti-c/M)
- A and B subtypes
- Red cell transfusion
- Anti-A1 in group A subtypes
- Cold agglutinins (anti-I/HI)
- Rouleaux
CASE 1

- 31 year old female, pregnant

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<th>Anti-AB</th>
<th>Anti-D</th>
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CASE 1: Resolution steps

- Weak B subtype considered
- Same results on manual repeat
- Previous results: B Rh(D) Positive in 2001 with normal reactions
- Transfusion history: none noted
Initial conclusions

• Sample sent to ARCBS RCRL
• Report: Probable B3 (Some polyclonal anti-B eluted in adsorption elution studies)
• Not consistent with previous results from 2001 (normal B)
• Haematologist contacted treating Dr from: CLL (2002)
• Patient received a BMT from a Group O donor in 2003 for her CLL at age 21
• This patient shows full RBC conversion B – O after 9 years
• Reverse group remains B (no Anti-B made)
Who’s blood cells?

- Haemopoietic cells replaced by donor cells to varying degree, depending on the extent of myeloablative therapy.
- Recipient lymphocytes may continue to proliferate alongside allograft resulting in incomplete chimerism.
- Follow up donor lymphocyte infusion (DLI) may achieve “Graft versus leukaemic” effect.
Questions

1. Why was anti-B eluted from the donor RBC’s?

2. Why reverse group unconverted?
Question 1

- Adsorption of some soluble Type 1 B substance on to allograft derived O cells and formation of small amount of immune complex with reagent anti-B
- Recipient derived glycosyltransferase may convert some H on allograft cells to B
Question 2

- Soluble Type 1 B substance would continue to be made by the vascular endothelium in secretors (80%) — this may adsorb anti-B produced by allograft lymphocytes.
- Presence of soluble Type 1 B substance may prevent immune system from making anti-B, i.e., immune system may still recognise B as “self.”
CASE 2: Herbal Cream and diminished Anti-A

- 54 yo female
- Clinical Notes: “On herbal cream that causes reactions to certain blood”

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Case 2 Resolution

- Repeat manually, same results
- Plasma negative with A2 and O cells at RT
- Possibility of Group A subtype (Ael?) with a weak anti-A1
- Sent to ARCBS for subtype id
- ARCBS Report: Group O with very weak anti-A and normal anti-B!
What happened?

- Initial assumption partly based on common experience that the vast majority of Group O’s show similar isoagglutinin reactivity in the reverse group and that the significant difference in score was likely to indicate a variant Group A or a cold reacting interferant rather than markedly diminished anti-A titre
Discussion

• There are rare cases of diminished isoagglutinins healthy Group O individuals, mainly anti-A. These show no evidence of abnormal ABO genotype (see Olsson et. al)

• Should all cases of apparent Group O with significant reverse group score differences investigated further to reveal possible undetected weak A subtypes?

• We don’t always pick these up in an automated system
Lessons

• Initial assumptions based on experience and frequency can be incorrect, ie, “most likely” does not equal “definitely is”

• Beware of Red Herrings that tempt us to form assumptions:
  • Case 1: Absent anti-B can lead to assumption of B subtype.
  • Case 2: Weak Anti-A c/w Anti-B can lead to assumption of weak A subtype.
References

• Borosak Dr. Marija, ARCBS; personal communication
• Condon, Ms Jenny, ARCBS; personal communication
• Donor lymphocyte infusions to treat haematologic malignancies: section 5 of 9
• Webb, Mr Andrew, Alfred Pathology; personal communication