Identification of both allo & auto red cell antibodies of Kidd specificity in the same patient.

Edel Scally [1], Ann O'Sullivan, Barry Doyle [1], Sorcha NiLoingsigh [1], Kirstin Finning [2]

[1] Irish Blood Transfusion Service, National Blood Centre, James's St. Dublin 8, Ireland
[2] Molecular Diagnostics, International Blood Group Reference Laboratory, Bristol, U.K

Background

Autoimmune Haemolytic Anaemia (AIHA) is a relatively rare condition, usually found secondary to other haematological disorders/malignancies.

These patients can produce red cell auto-antibodies which can lead to an increased rate of red cell destruction.

Serologically, an auto-antibody usually presents with pan reactivity by both indirect antiglobulin test (IAT) and with enzyme-treated cells, along with a positive direct antiglobulin test (DAT).

It is critical to distinguish between an auto and allo-antibody as antigen negative units should be selected for transfusion when a clinically significant allo-antibody is present, to avoid the risk of a haemolytic reaction.

Some auto antibodies react preferentially with red cells of certain blood group types, most commonly with anti-Rh-specificity.

The Kidd blood group system contains three antigens: Jk^a, Jk^b and Jk3. Anti-Kidd antibodies have been implicated in causing delayed haemolytic transfusion reactions and haemolytic disease of the newborn.

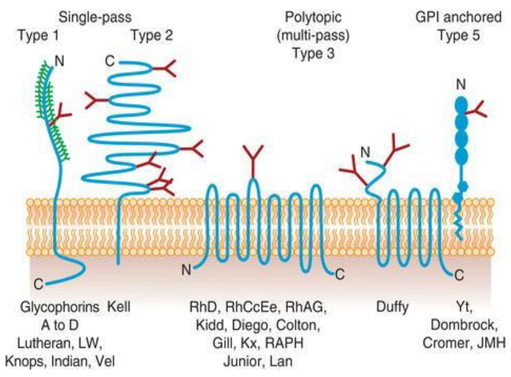

Figure 1: Diagram of different types of blood group active proteins and glycoproteins based on their integration into the red cell surface membrane. The Kidd blood group protein is a multipass trans membrane protein (Essential Guide to Blood Groups).

Reports of Kidd system auto-antibodies are relatively rare. An auto-anti-Jk^a has been found associated with non-haemolytic cases (Holmes *et al.,* 1976) and with one case of drug induced auto-immune haemolytic anaemia (Patten *et al.,* 1977).

Here we detail the presence of both auto and allo Kidd antibodies in the same patient and discuss the importance of correctly identifying each and the implications they have on patient care.

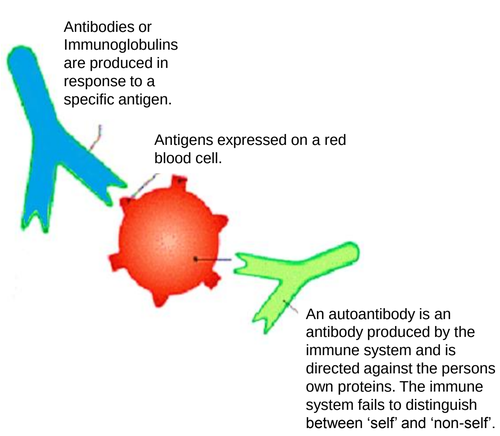

Figure 2: Depicts the binding of both allo-antibodies and auto antibodies to a red cell.

Methods

Serological testing was performed by the Red Cell Immunohaematology (RCI) Laboratory at the Irish Blood Transfusion Service (IBTS).

- ABO/D typing was performed by AutoVue Innova and by direct agglutination tube technique.
- Antibody investigation and DAT were performed by BioRad gel column technique.
- Adsorption studies were performed by incubation of equal volumes of complimentary adsorption cells, low ionic strength saline (LISS) and patient's plasma at 37C for 10 minutes.
- Molecular genotyping was performed by the International Blood Group Reference Laboratory (IBGRL).

Results

On first referral, the patient presented with a strong auto-antibody, pan reactivity with both IAT and enzyme panels. The DAT was positive with IgG and C3d. Following allo-adsorption (x1 @ 37C), an underlying anti-Jk^b was detected. Kidd phenotyping was not performed due to recent transfusion. The decision was made to send a sample to IBGRL for red cell genotyping, as the patient required multiple transfusions for the foreseeable future.

On fourth referral, following serial allo-adsorption (x3 @ 37C), the previously detected underlying allo-anti-Jk^b was detected along with an apparent anti-Jk^a.

Kidd genotype results were sought urgently from IBGRL. The genotyping results from IBGRL were as follows: D+ C+ c- E- e+ Fy^a+ Fy^b+ Jk^a+ Jk^b- K- k+ M+ N- S- s+.

The genotype was Jk^a+ Jk^b-, indicating that the anti-Jk^b was an allo-antibody and the anti-Jk^a an auto-antibody.

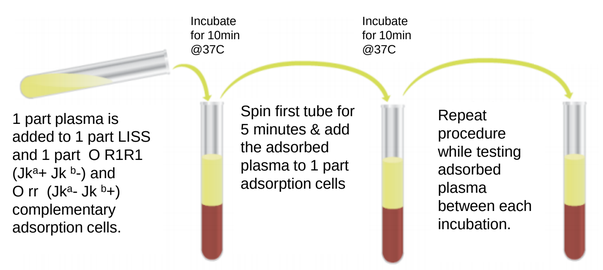

Figure 3: The procedure for serial allo-adsorption in the RCI Laboratory, IBTS. The patient's plasma was tested against complementary adsorption cells with different Kidd specificities (One Jk^a-, the other Jk^b-).

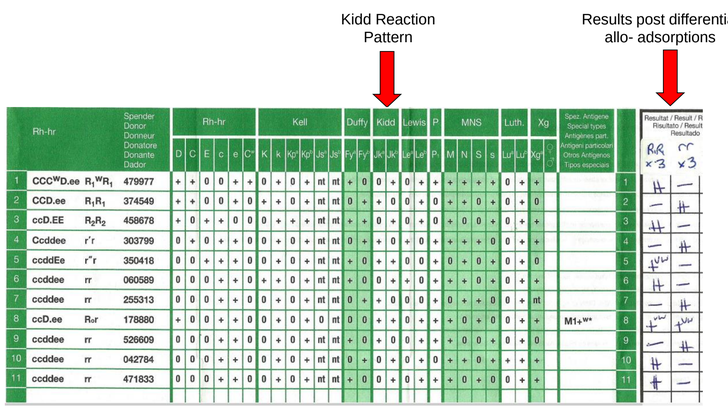

Figure 4: The reaction pattern obtained with the R1R1 and rr adsorbed plasma when tested against the 11 cell BioRad IAT panel.

Conclusion

The Jk(a-b-) phenotype of the Kidd system is extremely rare. The highest incidence of this phenotype was reported as 0.89% among New Zealand Polynesians (Woodfield *et al.,* 1982). This phenotype has only been reported once in a Caucasian person (Habibi *et al.,* 1976).

Several of the individuals with the Jk(a-b-) phenotype have anti-Jk3 in their plasma. Serologically anti-Jk3 behaves like a mixture of both anti-Jk^a and anti-Jk^b but cannot be separated into those specificities by differential adsorption. As shown in the results section following differential adsorption two individual specificities were obtained; anti-Jk^a and anti-Jk^b. This ruled out the possibility of the patient having an anti-Jk3 and therefore the Jk(a-b-) phenotype. At this stage we could assume that one of the antibodies was indeed an allo and the other an auto antibody.

Safe selection of suitable blood for transfusion was delayed in this case due to the anomalous detection of both anti-Jk^a and anti-Jk^b following allo-adsorption.

Red cell genotyping confirmed Kidd heterozygosity allowing Jk^a+ units to be made available for transfusion.

This case highlights the importance of identification of these 'mimicking' auto antibodies. The apparent reactivity of 'mimicking' auto-antibodies is thought to be dependant on the quantity or steric configuration of the corresponding antigen on some red cells (Issit & Pavone, 1978).

This case also highlights the importance of molecular genotyping where serological phenotyping is not possible. Rare Jk3- units would have been compatible with the allo-adsorbed plasma and suitable for transfusion, however, their importation would have been an inappropriate waste of valuable rare blood given that one of the Kidd antibodies was an auto-antibody.

References

Habibi B.; Avril J.; Fouillade MT,; Lopez M,; Vaucelle R,;Salmon C. Jk(a-b-) phenotype in a Frencg family. Quantitative evidence for the inheritance of a silent allele (*Jk*). Haematologia (*Budap*) 1976:10:403-410.

Holmes L.D.; Pierce S.R.; Beck M.L.: Autoanti-Jka in a healthy blood donor (Abstract). Transfusion. 1976;16:521.

Issitt PD. & Pavone BG. Critical re-examination of the specificity of autoanti-Rh antibodies in patients with a positive direct antiglobulin test. British Journal of Haematology. 1978;38:63-74.

Patten E.; Beck C.E; Scholl C.; Stroope R.A.; Wukasch C.; Autoimmune haemolytic anaemia with anti-Jka specificity in a patient taking aldomet. Transfusion. 1997;17:517-520.

Woodfield DG.; Douglas R.; Smith J.; Simpson A,; Pinder L,; Staveley JM.: The Jk(a-b-) phenotype in New Zealand Polynesians. Transfusion. 1982;22:276-278.

Contact Details:

Edel Scally
Irish Blood Transfusion Service
National Blood Centre
Dublin 8, Ireland
E: edel.scally@ibts.ie
P: +353-1-4322973
W: www.giveblood.ie