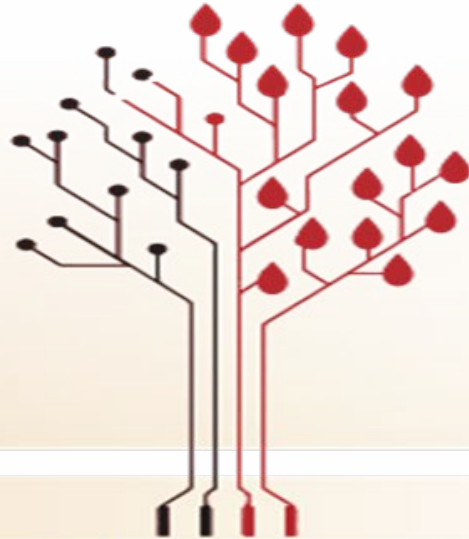




THE MONOCYTE MONOLAYER ASSAY:

A CASE STUDY



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Adapt • Innovate • Advance

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Background

What is the Monocyte Monolayer Assay (MMA)?

- In vitro assay
- Considered to be representative of in vivo survival of sensitized red blood cells
- Therefore, may be used as a predictor of:
 - The clinical severity of red cell alloantibodies
 - The severity of haemolytic disease of the newborn





Background

- Determine possible clinical significance of alloantibodies:
 - To high frequency RBC antigens where antigen negative blood is unavailable
 - In HDFN cases – on request or when participating in studies
- Post transfusion case monitoring:
 - Patients transfused with incompatible blood due to the lack of antigen negative blood





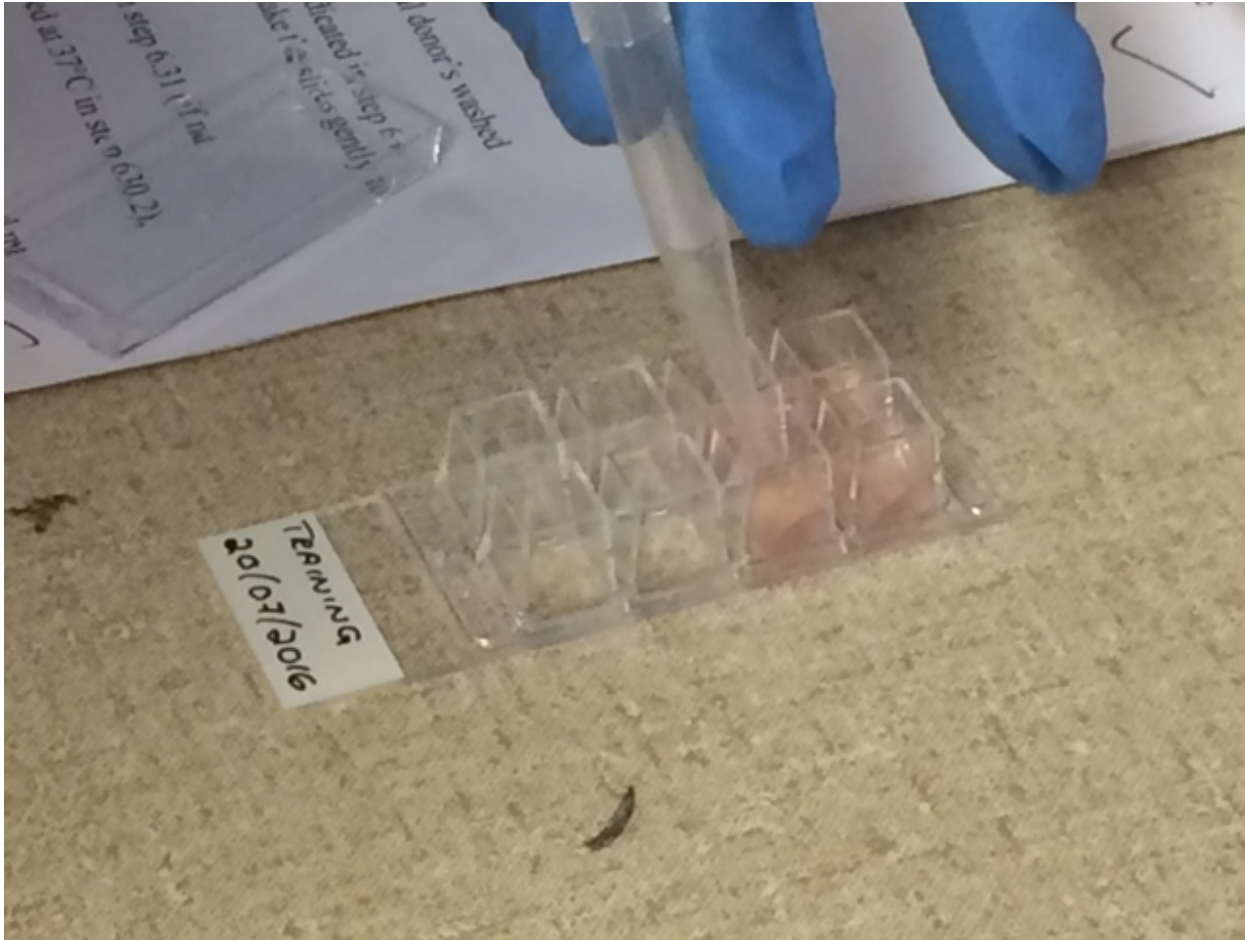
Background

- First developed in the 1970's
- Results used as additional information for the treating doctor when antigen negative units are not available:
 - Not a stand-alone test, entire case must be reviewed
- Not for use for patients with non-specific antibodies –
allo-antibody specificity must be identified





MMA Test Procedure



- Isolate monocytes from a fresh blood sample
- Layer the monocytes onto a chamber slide and allow to adhere



MMA Test Procedure

- Sensitize the incompatible RBC for transfusion with the patient's antibody +ve plasma
- Add the sensitized cells to the adhering monocytes in the chamber slide
- Incubate at 37°C to facilitate binding of sensitized cells and monocytes
- Remove unbound cells by washing and stain slide





MMA Test Procedure



- $\leq 5\%$: incompatible blood may be given with little risk
- **5.1 - 20%**: 33% of patients may have clinical signs of a reaction
- **>20%**: 64% of patients may have clinical signs of a reaction

Accessed online on 10/08/2016 at www.ucdmc.ucdavis.edu





Case Study – Patient X

- 75 year male, with chronic renal failure
- History of multiple transfusions
- First presented as a problem crossmatch case \pm 2011
- Multiple red cell antibodies: anti-D, -C, -E, -K, -Fy^a, -Yt^a
- Group O, Rh Negative



Case Study

- Blood not readily available for this patient
- No compatible donors in South Africa
- Screen for compatible blood - D, C, E, K, Fy^a and Yt^a
antigen negative blood is required
 - Yt^a is a high frequency antigen
 - Anti-Yt^a reagent not readily available





Case Study

- 2 x units sourced from International Rare Donor Registry
 - Not sustainable for ongoing transfusion requirements
- Least incompatible blood issued, the use of IV-IG recommended
 - Units confirmed negative for the D, C, E, K, and Fy^a antigens
 - Most likely Yt^a antigen positive





Case Study

- Incompatible transfusions well tolerated by Patient X
- IV-IG is extremely expensive, costs often not covered by medical aid
- Is the IV-IG really necessary?
 - Clinical significance of the anti-Yt^a antibody?
 - Will the antibody cause increased RBC destruction if incompatible units are transfused?





Nature of the Case

- MMA
 - Considered to be representative of in vivo survival of sensitized red blood cells
 - Therefore, may be used as a predictor of the clinical severity of red cell alloantibodies
- Patient X's previous tolerance of incompatible blood transfusions
 - Expected MMA result of low clinical significance





MMA Results

Pos control	Anti-D & D Pos cells	50.5%
Neg control	Anti-D & D Neg cells	7%
Cell 1+ patient serum	D-, C-, E-, K-, Fy ^{a-} , Yt^{a+} cells	13.5%
Cell 2 + patient serum	D-, C-, E-, K-, Fy ^{a-} , Yt^{a-} cells	8%





Interpretation of MMA Results

- Positive and negative controls required with each MMA test
- Control results may be unpredictable due to unknown reactivity between RBC and monocytes
- The %R of the negative control and Cell 2 suggests non-specific background reactivity of donor monocytes to the sensitized RBC.



Conclusion

- The actual %R of Cell 1 not conclusively determined, however:
 - %R of these incompatible cells demonstrates that the anti-Yt^a is of low severity
- Consistent with his tolerance to previous Yt^a incompatible transfusions.
 - Yt^a positive RBC may again be considered





Conclusion

- Performed by SANBS Reference Laboratory
- Not available in emergency cases
- Only when compatible blood is not available
- Provide extra information to the treating doctor:
 - **Patient's clinical condition and urgency of transfusion requirement is always the driving factor behind the decision to transfuse incompatible blood**





Acknowledgements

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References

- A retrospective analysis of the value of monocyte monolayer assay results for predicting the clinical significance of blood group alloantibodies. Arndt PA, Garratty G. Transfusion 2004; 44: 1273 – 81
- Monocyte Monolayer Assay; Special Immunohaematology Laboratory, American Red Cross Services, Southern California Region, Pomona, CA



Thank you