Molecular ABO Typing of Deceased Solid-Organ Donors

Burhan Jama, Xiaoming Zhu, Nicole Farris, Tram Pham, Gerald P Morris, Amena Usmani

Immunogenetics and Transplantation Laboratory, University of California San Diego, La Jolla, CA 92093

Introduction

- Clinical testing for ABO relies primarily on serologic testing, using well-characterized sera to identify the expression of A and/or B antigens on RBCs, using defined reference RBCs to test for the presence/absence of specific isoagglutinins
- There are clinical situations where serologic testing may yield inconclusive or inaccurate results
- Recent transfusion can temporarily replace a patient's own cells and/or plasma, diluting or masking the patient's phenotype. In these individuals, serologic typing may result in equivocal results due to discrepancies between forward and reverse ABO typing
- Identification of specific *ABO* sequence variants causing expression of ABO antigens enabled development of clinical DNA-based testing approaches for ABO blood group typing

Aim

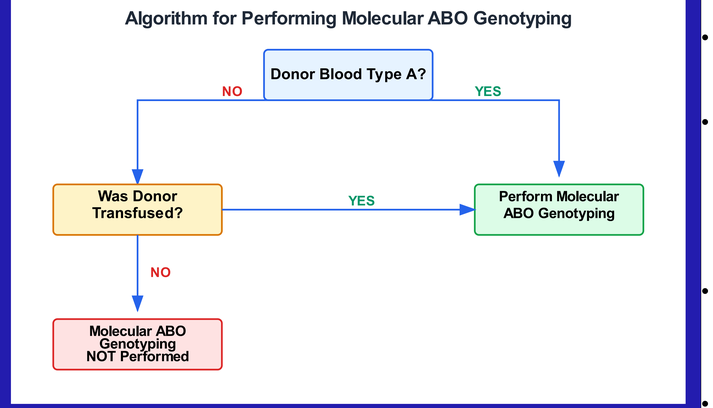
- To evaluate the utility of molecular ABO typing in deceased solid organ donors compared to serologic ABO typing

Materials and Methods

- Data was collected retrospectively on all molecular ABO typing performed on deceased donors according to clinical testing protocol between July 2023 through March 2025 (N = 42)
- Molecular ABO typing was performed on blood or buccal swab samples using LinkSeq ABO kit (Thermo Fisher)
- Molecular typing results were compared to serologic typing results uploaded into UNET for all donors
- Data was also collected on number of transfusions received by each donor.

Indication	Sample type	Concordant with Serology	Comments
Transfusion (N = 25)	Buccal	24/25 (96%)	1 donor A2 by molecular vs A by serology
A subtype (N = 15)	Blood (N = 2), Buccal (N = 13)	15/15 (100%)	
Unknown (N = 2)	Buccal	1/2 (50%)	Serologic typing unavailable in one donor

Table 1. Molecular ABO Typing Results By Indication



Results

- Molecular ABO typing was performed on 42 deceased donors, of which 41 had concurrent serologic typing
- 25 (60%) donors received RBCs or whole blood during hospital course, 15 (36%) donors did not receive blood products (molecular ABO was performed to confirm serologic blood group A subtyping), and 2 (4%) did not have any clinical data in UNET to determine transfusion status
- Of the 25 patients that received blood, 12 (48%) received 1-5 units, 7 (28%) received 6-10 units, and 6 (24%) got >10 units
- Molecular and serologic ABO typing were concordant in 40 of 41 (98%) donors
- One sample typed as A2 by molecular and as A by serology

Conclusions

- Molecular ABO genotyping was concordant with serologic typing in 98% of donors tested. In the one donor with discordant molecular and serologic ABO, serology typed the donor as A and molecular methods typed the donor as A2. Review of this case revealed that serologic typing had been performed post-transfusion and was unable to accurately assess A subgroup
- Molecular ABO genotyping is especially useful to enable accurate blood group typing in cases where serologic testing may be ambiguous or difficult to accurately perform.
- Accurate A blood group subtyping is particularly important in the setting of transplanting A2 and A2B kidneys into group O and B candidates, which has increased equitable access to kidney transplant in minority ethnic groups
- The inability to accurately subtype group A deceased donors post-transfusion can limit access of these kidneys to traditionally disadvantaged O and B recipients
- We recently implemented routine molecular ABO genotyping for all OPO deceased and kidney donors, which has facilitated 4 non-A1 to B kidney transplants at our institution
- Widespread adoption of molecular ABO genotyping may be useful in expanding non-A1 to B kidneys.

References

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